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MAR 16 1934

Vol. 20 MARCH, 1934 No. 3

International Journal of Orthodontia and Dentistry for Children

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International Journal of Orthodontia and Dentistry for Children

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The International Journal of
Orthodontia and Dentistry
for Children

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VOL. 20 ST. LOUIS, MARCH, 1934 NO. 3

ORIGINAL ARTICLES

PRESIDENT'S ADDRESS*

AMERICAN SOCIETY OF ORTHODONTISTS

W. E. FLESHER, D.D.S., OKLAHOMA CITY, OKLA.

AT THIS time I wish to acknowledge with sincere appreciation the high honor which this Society has conferred upon me. I assure you it has been a pleasure to serve in my humble capacity.

The holding of our annual meeting at this time of year is unusual. According to past experience and custom, the spring meeting is more satisfactory. Attendance is always larger and absence from our offices interferes least with our practice.

When the bank moratorium was authorized early in March, the question arose, "Shall we, or shall we not, hold the meeting as scheduled in April?" After communicating with the Executive Council, past-presidents and others, which represented every section of the Society, postponement was recommended, with but one or two exceptions.

After much correspondence and in consideration of every one concerned, the present dates were chosen. We know full well that these dates are not the most popular. A later date would have necessitated a complete change in the program; a breaking of the morale, and an additional heavy burden on all committees, as well as expense. We trust that you will find the program profitable and that you will have such a good time that you will all want to come again.

It has truly been a pleasure to work under the present Constitution and By-Laws. Every section is thoroughly coordinated—no conflicting sections as is usually the case with many constitutions and by-laws. It is rhetorically and legally correct, and the printing is of a very high order.

*The Thirty-Second annual meeting, Oklahoma City, Okla., Nov. 8-10, 1933.

The basic principles for the operation of an organization are so thoroughly and clearly outlined that the interpretation is most simple. No better illustration of this could be found than in the procedure outlined for the postponement of our meeting.

Personally, and for the Society, I wish to thank the Committee for its many hours of tedious and careful service rendered the American Society of Orthodontists in giving us this excellent Constitution and By-Laws.

The Program and Local Arrangements Committees have worked untiringly. The duties and problems associated with the postponement added much to their tasks. The Program Committee has an excellent program for us.

No finer cooperation could have been given by any committee than that of the Local Arrangements, with Dr. T. W. Sorrels as chairman. The problems have been many, but were happily solved; every one doing his part to see that our guests were well cared for.

The members of the Oklahoma County Dental Society and local committees have cooperated fully. Whatever the success of this meeting, credit largely goes to the Program and Local Arrangements Committees.

Too much commendation cannot be given our Secretary, Claude Wood. He keeps all books in an excellent manner. He is prompt and efficient in serving the Society.

The basis of science is *truth*. Truths are made up of facts. Facts are developed through investigation—research.

In orthodontia we sadly need more of the truth, more facts, more research. Some of our theories in etiology are not supported by facts. Some positive statements are made from mere clinical observation as to causes, when in reality the symptom may be, and likely is, only a contributing factor. A critical and literal survey of orthodontic literature has many surprises. Brash's survey of orthodontic literature has presented literally its status, at least, at the time it was compiled, some four years ago.

Many of his conclusions do not harmonize with our past thoughts on etiology. His report of conclusions represents an unbiased study of our literature. If we do not agree with his interpretation, then it is our problem to present the facts so that our literature will more nearly present the truth.

More important facts on etiology have been brought to light in the three or four years just past than for many years previous. Such men as Hellman, Marshall, Broadbent, Dewey, Ketcham, Howard and others, have been giving unstintingly of their time in developing newer knowledge in orthodontics.

These men were not satisfied with things as they were. They cannot always continue this work. What then? This work must go on. By whom and how? Some program must be made for the further carrying on of research.

The report of our Research Committee will perhaps have some recommendations. Let us consider them carefully.

There is hope, however. Other great students will develop and continue the work of research. In my estimation one of the finest outgrowths of the activities of the American Board of Orthodontia will be the development of deeper studies in orthodontics. The constant recording of data as advocated

by the Board will show some interesting phenomena. These will be facts. Our literature then will be well grounded.

The Board endeavors to aid an orthodontist to higher attainments and then inspire him to do his best, not for selfish gain, but for service to humanity. Any one desiring to be certified will be warmly received and assisted as far as is possible in the preparation of case reports and theses. Those who appreciate the certificate most are those who strive to meet the requirements suggested for them. It has a very fine influence; a man is not satisfied when he is certified, but wants to continue to improve himself so as to merit the certificate at all times. I cannot too strongly urge more members to make application to the Board. It shall ever be the incentive to a higher standard of practice. The members of the Board take their task seriously. It is their desire that their service will be helpful to all.

Letters from those certified by the Board indicate that the founding of this Board through the influence and hard work of Dr. Ketcham, was a progressive step.

Twenty years ago the publication of the INTERNATIONAL JOURNAL OF ORTHODONTIA was launched, the first journal published exclusively for our specialty. Almost since the very beginning it has published the proceedings of the American Society of Orthodontists. It has served the needs of the Society.

A brief mention may be made of the Third International Orthodontic Congress. At the Second International Congress in London, it was decided to hold the next Congress in an English-speaking country. Our Canadian members are desirous that the Congress meet with them. Owing to the excellent steamship facilities they have selected Montreal. I am sure our membership concur in their wishes. Because of the present world situation, the sentiment both abroad and in America favors deferring the time of meeting of the next Congress until 1938.

Since our last meeting, three of our past-presidents have died.

Dr. William C. Fisher, New York City, passed away in October, 1932. Through his natural endowment, his training and experience as an army officer, he was truly a splendid leader and organizer. Through his driving force and leadership he successfully organized and served as the executive head of the First International Congress. So successful was this first Congress that it was voted to hold one every five years. A lesser spirit and organizer could not have accomplished what he did. It stands as a tribute to him.

In May, 1933, Dr. Martin Dewey died suddenly—a severe shock to his many friends. Orthodontia lost one of its most ardent leaders. His knowledge of orthodontia was truly basic. He also had a wide knowledge of collateral science. His was a great analytical mind; he followed unswervingly and unbiased his conception of the basic principles of orthodontia. His ability as a teacher was highly respected by his students. His approach to a subject inspired one to wider and collateral reading. The receipt of many communications following his death attested the high regard in which he was held by the dental and orthodontic professions. Dentistry and orthodontia, especially, are the better for his having lived. His contribution in lectures, as an

author, and in research, have added to the knowledge of the profession. With those who have sat under his teachings, he left a desire for further study and research.

On June 28, 1933, Dr. Milton T. Watson of Detroit passed away. His death was a distinct loss to the dental profession. Not only was he outstanding in the general practice of dentistry but as one of the pioneers in orthodontia he served the specialty by helping to outline the principles and standards of practice. He was president of the American Society of Orthodontists in 1903 and again in 1912.

He had exceptional ability and a fine sense of ethics, in the treatment both of his patients and of his fellow practitioners. His withdrawal from active practice and activity in the American Society of Orthodontists a few years ago was a loss to the Society. His counsel was most highly prized.

The American Society of Orthodontists owes its organization largely to the influence and inspiration of Dr. Richard Summa, who died April 8, 1933. Although never having served as president, yet he was an influential figure in the organization for a number of years. He gave up the practice of orthodontia in 1912 to enter other fields of endeavor.

He had an important part in the early development of orthodontia. The first constitution and by-laws of this Society was largely the product of his fertile brain. He had a brilliant intellect and was an excellent teacher. He was associated with the Angle School of Orthodontia in its early years, and later with the Dewey School and with the Dental Department of the University of Iowa.

He was a talented musician and had a keen appreciation of the finer things. Even though he served in other fields for a number of years, he never lost interest in the profession, for he was happiest when talking with others about orthodontia.

At this time, when there are more leisure hours about our offices, the forming of groups for study should be especially encouraged. There are comparatively few places where distances are too great but that even a few could get together occasionally for some effective study.

In addition to the helpful influence of concentrated study of orthodontic problems, other benefits automatically develop by the occasional association of the members making up these groups. One of these is the natural development of a fine spirit of fellowship. All are brothers, so to speak, in a common cause. There is no "better than thou" spirit among its members.

This spirit of fellowship will serve in referring patients, which is a problem in some practices.

Naturally the members would feel perfectly at ease in referring patients to other members of the group, well knowing that the same general plan of treatment would be used, that there would be no gross change in the appliances in use and an embarrassing additional expense for some one.

All things grow from a small beginning. This is true of study groups. They will increase in size and interest, until the resultant effect is widespread. An illustration of this is the growth from a mere half dozen, at its organiza-

tion, to the present membership of half a hundred, of the Southwestern Society of Orthodontists. It was the first group to use the postgraduate idea. The ablest educators in orthodontics and allied subjects have served as instructors. Their spirit and sincere devotion to orthodontia service still live with the members of the group.

This unity of thought and purpose in serving humanity gives one added pleasure in conducting an orthodontic practice.

The growth of the sectional societies has been almost phenomenal. Their programs are now of a very high standard and of much practical benefit. Their meetings are well attended. In fact, their programs are real competitors of the American Society of Orthodontists. In order that all society meetings be well attended, the officers should coordinate their plans and dates of meeting.

Because of the time and place of this meeting, the Southern and Southwestern Societies postponed their annual meetings. At this time, I wish to express to them my sincere appreciation for their kind consideration and cooperation.

Our sectional organizations offer unusual opportunities for the development of its members. They should be encouraged to contribute to the programs.

The interchange of ideas is most beneficial in the dissemination of knowledge and the development of talent, and economically, in saving the expense of imported talent.

Many problems will arise upon which further information is desired. These problems should be brought before the American Society of Orthodontists. Through its programs or research, such problems should be considered.

One can readily see the interrelation of the interests of the sectional societies and the American Society of Orthodontists. In addition, the American Society of Orthodontists' membership should be determined in the sectional societies, since the question of membership resolves itself into a local matter.

Here again, as was first brought before this Society by Dr. C. C. Howard some eight years ago, arises the question—should not the sectional societies be a component part of the American Society of Orthodontists?

There are many points in favor of this proposition, upon which I shall not enlarge:

1. The American Society of Orthodontists serves as a clearing house of orthodontic theories and technics.

2. Membership problems are taken care of in sectional societies.

3. Orthodontia is more closely organized, educationally and politically, meeting many of the legislative problems now developing.

4. Economically an advantage.

5. Through an associate membership a closer relationship could be effected by those not in exclusive practice.

The interests of the sectional societies and the American Society of Orthodontists are each definite; each has its place and function, a combination of which will be of value to orthodontia.

I recommend to this body a careful consideration of correlating the interests of the sectional societies with those of the American Society.

At this point I want to urge the membership to support the orthodontia section of the American Dental Association. Many dentists interested in orthodontia and attempting some treatment in their practice are looking for information. It is the duty of the members of this body to serve in whatever capacity possible so that safe and successful treatment may be carried on in a divided practice.

A number of our members have served with honor as officers of the orthodontic section of the American Dental Association in outlining excellent programs. Here is a field for excellent service, either in the official rank, or as contributors.

These times are unusual. Orthodontia, like all other endeavors, professional or otherwise, is perhaps at its lowest ebb. From here, there is but one way to go, and that is *forward*. Our profession is new—the spirit that created and built it is still potent. We are most fortunate to have among our members so many of the early pioneers of this specialty; the men who pushed out into the uncharted waters and created a new profession because of their interest in the welfare of humanity. With these men to hold the boat steady, and with the power and enthusiasm of the fine younger men in the profession, we need have no cause to conjecture about the future. Optimism is the controlling power that shall now hold us steady until the flow of the tide shall carry us on to greater accomplishments. We are perhaps the better constituted now for a greater service.

Our membership should hold to a steady course. Our fortitude and courage are now being tested. It has been necessary to alter our standards of living. It is said, "We are back to normal and do not know it."

The problem of fees and collections is more serious now, perhaps, than ever before. In many cases meeting the necessary financial obligations has been a task. We should not become panicky about fees. There should be a good reason which must be thoroughly explained when one discounts one's fees. A reduced fee causes a trend toward cheaper materials, especially since there has been a recent advance in the precious metal materials, which have been developed and used in the last decade and a half. The use of these high grade materials has done much to bring about the high character of orthodontic practice which is possible at this time.

We must not overlook the fact that the manufacturers, through their research and much expense, have rendered a service to orthodontia in furnishing materials of uniformity and quality which are necessary in the development of the present standard of excellence in orthodontic technic.

The adoption of cheaper materials should be done cautiously. It should be done wholly upon the merit of its service to the patient. In most offices, the cost of applicance material is small in comparison to the entire cost of conducting a practice. Oftentimes a cheaper material becomes expensive because of a more extended technic and other added burden costs.

Quite a problem is now existing. For four years, there has been a greater neglect than normally by the financially stressed public in taking care of the

dental health. There will be a tendency toward a lowered general health. Children, especially, may be affected through lack of proper diet and care of carious teeth, all of which interferes with function, normal growth and aids in producing many malocclusions of the teeth.

There must be a revival of interest in the dental health. We must not allow a trend backward. Good dental health means a better general health. At these times the public needs good health. It cannot afford the luxury of disease.

Our duty lies in cooperating in our general dental programs and furthering the interest in dental health.

We are launched in a new era; the old days are gone, possibly never to return. The conduct of our practices must be readjusted to meet existing and new conditions. Commercialism has run rampant in the past decade or so, in every line of endeavor; dentistry not excepted.

Professions need more good will and confidence. To restore and build further confidence, we need to give more and more thought to service. Though we are in private practice, we also have a certain responsibility in aiding and promoting a better public health. A new day as well as a new deal, is ahead of us. We are in a better position to serve humanity than ever before.

Early supervision with timely treatment in orthodontic service is a valuable measure in prevention. It is a most potent time to serve the public health.

A DIFFERENTIAL DIAGNOSIS OF CERTAIN TYPES OF FACIAL DEFORMITIES AND THEIR TREATMENT*

J. Elon Rose, D.D.S., Iowa City, Iowa

Professor and Head of the Department of Orthodontia, College of Dentistry, the State University of Iowa

WHAT is diagnosis? What position does it occupy as to its relative importance to other orthodontic problems?

Diagnosis is defined by Dorland as "the art of determining the nature of a case."

Differential diagnosis is defined by the same author as "the art of distinguishing between allied diseases."

It would appear then that diagnosis is the very first consideration when a patient presents for treatment, and a differential diagnosis is a close second.

For an orthodontist to undertake the treatment of a case of malocclusion, involving possibly a marked facial deformity, without an intelligent diagnosis is analogous to a physician's attempting to treat a disease without an intelligent understanding of the nature of the ailment.

As we said, a differential diagnosis in medicine is "the art of distinguishing between allied diseases." A parallel in orthodontia would then be, for example, the art of distinguishing between Angle's Class III malocclusions.

Just because a case is classified in accordance with Angle's classification does not necessarily mean that one has a true concept of the nature of the case.

It is conceived that it is most imperative that a differential diagnosis should be made which shall deal with more fundamental structures than simply the relation of the teeth.

We are also concerned with the contour of the face, which is dependent upon developmental processes of other structures besides the teeth, and in certain instances upon the reaction of the individual to his environment.

Our concept of the entire orthodontic problem is largely one of beauty and harmony of the human face, and so confident are we that this should be the goal of the orthodontist, that we have coined the phrase *the efficiency of beauty* as being an appropriate slogan for the orthodontist, and the establishment of it should be the highest ambition of the profession.

Some will challenge that slogan and contend that efficiency should be the prime object of the orthodontist and that beauty should be accorded the second place of importance.

It is, however, an exceedingly difficult thing to relegate it to second

*Read at the Thirty-Second Annual Meeting of the American Society of Orthodontists, Oklahoma City, Okla., Nov. 8-10, 1933.

place. It cannot be kept in the background. Personally, I am willing that it should be accorded first place because of *the efficiency of beauty.*

We see it on every hand. Cast your eyes about you, out over the landscape. You see the beautiful trees; and the more beautiful they are, the more luxurious the foliage to protect the traveler from the heat of the noonday sun. The more magnifificent they become, the more efficient they are from every point of view.

It is the principal glory of orthodontics that "It has exchanged beauty for ugliness and the oil of gladness for mourning." It has like magic transformed the pale and sunken cheek into the cheerful blush of health and beauty and thus has sweetened the spirits of many a youth and brought happiness and success into the lives of countless numbers. Because of *the*

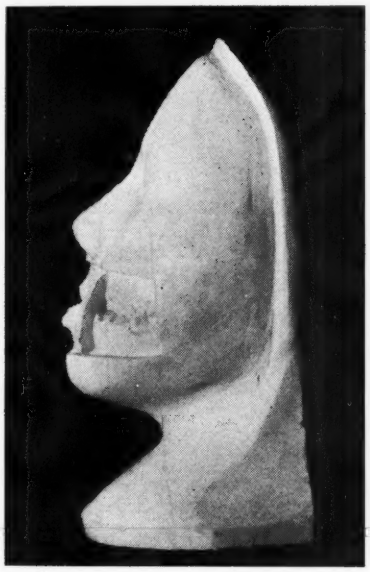

Fig. 1.

Fig. 2.

efficiency of beauty, it has by its beneficent service put new hope into the lives of numberless children who were crushed under the ruthless heel of deformity.

TERMINOLOGY

We have applied the terms micro- and macrodevelopment to conditions in which the particular deformity was considered to be the result of inheritance or of an endocrine disturbance.

The terms inhibited and augmented growth we have used in connection with those cases in which the disturbing element was considered to be some purely local condition, such as a mandibular habit.

The mesial malposition of the mandible has to do with the relation of the condyle with the glenoid fossa, in contrast to a macromandibular development.

We find all of these conditions classified in accordance with Angle's classification as Class III malocclusions, yet all differing quite radically and all requiring quite different treatment.

DIFFERENTIAL DIAGNOSIS OF SPECIFIC CASES

CASE 1.—Girl, seven years of age. (Figs. 1 and 2.) This case was diagnosed as a micromaxillary development associated with a normal mandible.

The primary reason for thus diagnosing this case is the standard of art as exemplified by the works of art in general, in relation to the human face.

The second reason is the fact that in this case there had been no local interference with the growth of the maxilla as is shown by the labiolingual relation of the maxillary and mandibular anterior teeth, there being considerable space between these teeth.

The treatment consisted in moving the maxillary teeth mesially, using the mandibular arch as a point of anchorage only. Treated case shown in Figs. 3 and 4, patient eight years of age.

Fig. 3.

Fig. 4.

A point of interest in connection with this particular case is that there were four in the immediate family with the same type of anomaly.

CASE 2.—A young man, twenty-three years of age. (Figs. 5 and 6.)

This case was diagnosed from the facial contour as being a case of micromaxillary development associated with macromandibular development. There were several possibilities in the way of treatment in this case. However, there was but one best method of treatment, and, of course, the problem was to decide what that best method was. The logical method would be to move the maxillary teeth forward and the mandibular teeth back, provided there was room to move the mandibular teeth back. There was, however, no room to move the mandibular teeth back in this case. Another method of treatment would be to extract two mandibular premolars and move the teeth anterior to those extracted back and, of course, the maxillary teeth forward. Still another method would be to move the maxillary teeth forward, not moving

the mandibular teeth at all. After having treated the case, we feel that perhaps we did not choose the best method. The method we chose was the last mentioned, in which there was no movement of the mandibular teeth, there being no room to move them distally. Figs. 7 and 8 show the treated case. We do feel now that the extraction of two premolars might have given

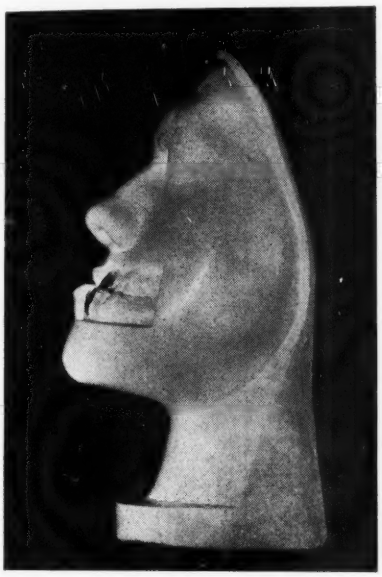

Fig. 5.

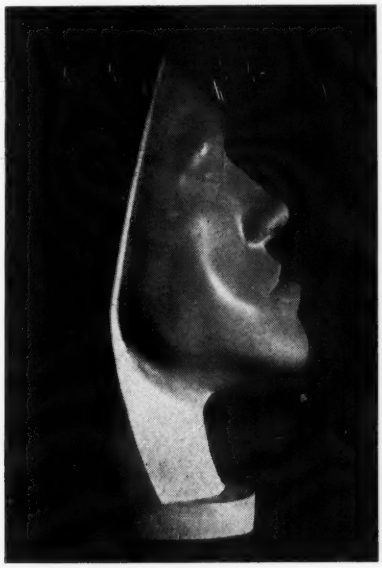

Fig. 6.

Fig. 7.

Fig. 8.

more pleasing facial contour, although we cannot be sure of that, not having tried it in this case. What we have to guard against in making extractions in these Class III malocclusions, where there is an overdevelopment of the mandible, is an accentuation of the prominences of the chin by this extraction and by moving the mandibular anterior teeth back.

This second facial cast was taken before the appliances were removed and just eighteen months after treatment was started, and consequently, we may expect some growth to take place after this time.

CASE 3.—Fig. 9, male, twenty years of age.

This case was diagnosed as a macromandibular development with a normal maxilla. The only satisfactory treatment for this case would be a mandibular resection. Orthodontically, he might have had treatment which would

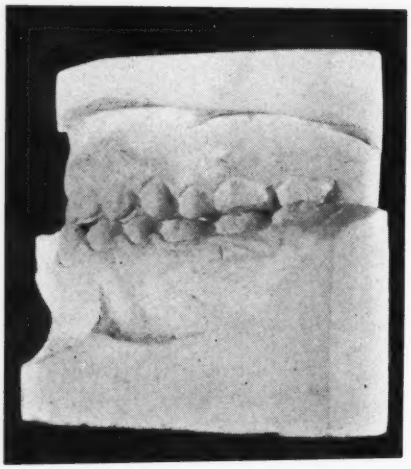

Fig. 9.

Fig. 10.

Fig. 11.

have improved the masticatory efficiency to a limited extent. The case was not treated on account of lack of cooperation.

CASE 4.—Figs. 10 and 11, male, nineteen years of age.

This case was diagnosed as a mesial malposition of the mandible associated with an augmented growth of the mandible and an inhibited growth of the maxilla.

In regard to the differential diagnosis, why the distinction between this

case and Case 2? Why do we not classify this case as a macromandibular development associated with a micromaxillary development?

Upon casual examination of a case, if you observe that the maxillary and mandibular teeth are in close contact, you may be almost sure without further examination that there is a mesial malposition of the mandible, due to the fact that the anterior teeth have been interfering, and upon closure of the teeth, in what would be centric occlusion, it would be necessary for the patient to protrude the mandible. A close contact of the anterior teeth is what we have in this case.

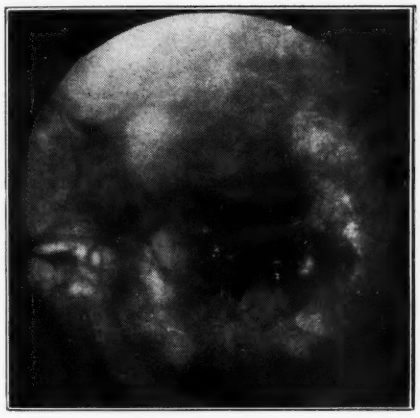

Fig. 12.

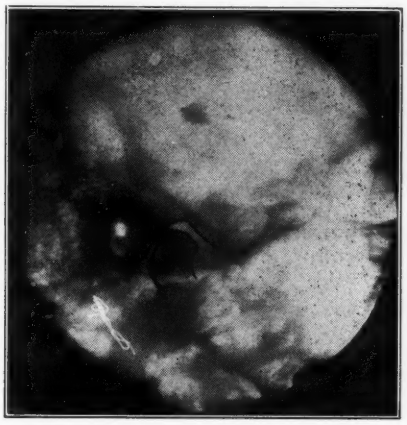

Fig. 13.

Fig. 14.

Fig. 15.

The contact of the maxillary and mandibular anterior teeth has, in the case of the mandibular arch, caused an augmented growth, while in the maxillary arch it has inhibited growth in that region.

As further evidence that the diagnosis is correct in this case, see Fig. 12, in which is shown the relation of the condyle in the glenoid fossa before treatment was instituted.

This shows clearly that there was an abnormal temporomandibular relation upon closure of the posterior teeth. In Fig. 13 you will see the relation of the parts after treatment, which is the normal relation.

A habit of protruding the mandible during the eruption of the anterior teeth was no doubt the cause of this condition.

The treatment in this case consisted in removing the interference of the anterior teeth, by the use of a bite-plane, after which the patient could assume a normal position of the mandible.

An appliance was adjusted to each arch and intermaxillary anchorage established and the maxillary teeth moved mesially, using the mandibular arch mainly as a point of anchorage. On account of a pathologic condition around the mandibular first molars, they were removed, and there was slight distal movement of the mandibular anterior teeth, including the premolars.

The patient experienced some difficulty in taking this new position with the mandible, as a result, no doubt, of a thickening of the meniscus of the temporomandibular joint.

It is perhaps needless to say that the loss of the maxillary left canine and premolar was due to an accident some years before.

In Fig. 11 we see the facial contour before treatment was instituted, and in Figs. 14 and 15 we note the change produced.

OBSERVATIONS REGARDING THE DENTAL DEVELOPMENT OF CHILDREN WITH ENDOCRINE DISTURBANCES*

CARLETON JAMES MARINUS, M.Sc., M.D., DETROIT, MICH.

THE RECENT demonstration of the importance of the endocrine system in the control of development has very naturally raised the question as to how large a part these glands play in the production of abnormal conditions in the mouth. Unfortunately there have appeared in the literature many statements regarding the relationship between various hypothetical glandular disturbances and specific orthodontic problems, leading perhaps to the conclusion that the great majority of malocclusions develop upon an endocrine basis. These conclusions are based upon incorrect conceptions of glandular disorder and should not be accepted without a more critical analysis of the various factors involved.

Five years ago the city of Detroit set aside a sum of money for the study of the causes of mental retardations. I was privileged to have a part in this work. In our study we have examined more than five thousand school children with particular reference to their endocrine status. In the course of this investigation we found quite incidentally certain characteristic disturbances in dental development which occurred uniformly in association with certain characteristic endocrine disturbances. These observations are the basis for this paper.

In order to clarify our thinking regarding the endocrine system it might be well to review briefly the various glands and to point out their functions under normal conditions:

The pineal gland is located in the center of the skull; very little is known about its normal functions except that very rarely it undergoes adenomatous degeneration in very young children. There then follows a very spectacular disturbance in development. The child grows with excessive rapidity, matures sexually at a very early age, and shows an extraordinary mental development. These children always die early because of the pressure effect of the rapidly growing tumor. Nothing is known regarding the purely hypothetical condition of pineal deficiency. The pineal can obviously play no part in abnormal dental development because even these striking cases of pineal pathologic condition show perfectly normal teeth.

The pituitary gland is located in the base of the skull and consists of two distinct portions, or lobes. The posterior lobe is derived from brain tissue and produces several distinct hormones which act in association with certain nerve centers in the base of the brain to control water balance, body temperature, and certain steps in carbohydrate metabolism. Neither the administra-

*Read before the Thirty-Second Annual Meeting of the American Society of Orthodontists, Oklahoma City, Okla., Nov. 8-10, 1933.

tion of extract of the posterior lobe nor the surgical removal of the posterior lobe affects in any way the development or condition of the teeth.

The anterior lobe of the pituitary has, however, a fundamental importance in body development. This structure elaborates a hormone called the growth hormone which controls the rate of growth of all tissues. The administration of this hormone during the growth period of the experimental animal results in the symmetrical overgrowth of every structure in the body. Clinical cases are seen in which excessive activity of this gland during the prepubertal period results in the production of a symmetrical giant. Damage to this gland or surgical removal in the young animal results in a complete cessation of growth followed by the premature appearance of the degenerative changes of old age. Clinical cases of deficiency of this gland demonstrate a symmetrical undergrowth which if severe results in a true dwarf.

The administration of growth hormone or the excess production of this hormone as a result of a pathologic gland if occurring after puberty results in the production of excess growth in various tissues which is asymmetrical and not uniform in distribution. These cases are seen clinically as a result of tumor of the gland and are called acromegaly.

As the individual enters into the period of puberty there begins in the anterior lobe of the pituitary the production of a second hormone, the sex hormone, which controls the development of the external and internal genitalia. Coincident with this change in pituitary activity there normally occurs a similar increase in the production of growth hormone to be followed by a definite decrease. Disturbances in the production of growth hormone are capable of producing a marked alteration in the normal development of the jaws and of the teeth and will be given detailed consideration later in this discussion.

The thyroid gland lies just below the larynx, partially encircling the trachea. Enlargement of the thyroid is known as goiter. During fetal life and early childhood the thyroid gland controls differentiation or maturing of tissue. It is therefore of fundamental importance in the problem under consideration. In later life the thyroid gland controls the rate of function of tissue by regulating the rate of oxygen consumption and therefore energy production in each body cell. This function also has an important bearing upon dental problems.

The parathyroid glands, four to six in number, are small bodies located just posterior to or within the thyroid tissue. These glands have an extremely important function in the control of calcium metabolism. Accidental removal or damage to the parathyroid results in an inability of the system to mobilize calcium from the storage depots, the bones and the teeth. There then occurs a deficiency of calcium in the blood resulting in the condition called tetany. The patient with tetany shows an extreme irritability of the nervous system resulting in the production of characteristic spasms upon the least irritation. The blood calcium falls from a normal of 9.5 mg. to 6 mg. or 4 mg. Death may result if the condition is not corrected. This condition is not known to occur spontaneously.

Excessive activity of the parathyroid may result from tumor of one of the glands. In this condition there is an excessive mobilization of calcium

from the storage depots with the loss of large quantities of this essential mineral through the kidney and bowels. The calcium in the blood varies from normal to extremely high percentages. The loss of calcium from the bones results in cystic changes if localized, or if more generalized in the general softening of the entire bony structure with the production of Paget's disease. The cystic type is prone to occur in childhood or early adult life, while Paget's disease is more common in the later years.

It is quite possible that minor alterations of the level of parathyroid activity may occur at any life period. If so, one might postulate a decalcification of the teeth due to excessive parathyroid activity as one factor in dental caries. This very attractive hypothesis has indeed appeared in the literature as one of the etiologic factors in dental caries. Curiously enough, the treatment advised has been the administration of parathyroid substance or extract. Since it is known that a potent parathyroid extract actually increases the liberation of calcium from the calcium depots, this line of treatment would seem to be definitely contraindicated. As a matter of fact, at the present stage of our knowledge we are unable to recognize the minor disturbances in parathyroid function if such occur, nor has it been proved that the parathyroid gland is capable of injury by disease or infection. Its mechanism seems to be extremely stable, and there is absolutely no support for the hypothesis that the parathyroid is in any way responsible for dental caries.

The thymus is located in the chest anterior and superior to the heart. We recognize a disturbance in development in which the thymus and all the lymphatic structures in the body are overdeveloped and the suprarenal glands and cardiovascular system are underdeveloped. This condition appears in infancy, the babies being oversized with short, thick necks, square chests, short extremities. They are extremely susceptible to infection and to trauma and frequently die suddenly as a result of some trivial incident. If they survive they continue the overdevelopment and are seen as large, oversized children who are characteristically late in maturing sexually. The typical thymic child shows no characteristic disturbance in development of the teeth or of the jaws.

There is no known evidence supporting the hypothetical condition of thymus deficiency. The empirical use of thymus extracts has shown no characteristic results. The surgical removal of the thymus from young animals does not interfere in any way with their growth or development.

The suprarenal glands lie one above each kidney. They consist of two portions, the medulla and the cortex. The medulla produces a hormone, adrenin, known commercially as adrenalin or epinephrine. This hormone is liberated into the blood stream in emergencies and acts to increase the tone of the sympathetic nervous system at its nerve endings. The medullae of both suprarenals may be completely destroyed without interference with life or development.

The suprarenal cortex, however, is essential to life. Destruction experimentally or by disease inevitably results in the death of the individual. Recently an active extract has been prepared which enables the prolongation of life in these cases. The suprarenal cortex cooperates with the anterior lobe of the pituitary in the development of the sex organs which occurs at puberty

and in their normal function after puberty. Tumor of this gland in childhood results in sexual precocity with premature maturation of the sex organs. None of these cases have shown any characteristic distortion in the development of the jaws or teeth.

The sex glands or gonads begin to mature with the onset of puberty and play a part in the complex changes which occur at this period. The development of the secondary sex characters, adult type of hair, breasts and general character of fat distribution are dependent upon gonadal activity. The hormone from the gonad has an inhibiting effect upon the growth hormone so that a deficiency results in continued growth beyond the normal time. A resulting disproportion may involve the jaws if the error occurs at the appropriate time. Obviously, a disturbance in gonadal activity occurring after growth is complete can have no such effect.

For convenience in analyzing the problem before us I shall first consider the controlling effect of the glands upon growth during the period of fetal life and infancy, and then consider the mechanism at puberty.

Very early in fetal life, at about the time the first tooth buds begin to appear, the fetal thyroid begins to show its characteristic histologic appearance. Extracts of the fetal thyroid at this stage demonstrate the presence of the thyroid hormone. We must conclude therefore that this hormone is of great importance in the normal development of the fetus. One is able to recognize in the newborn baby evidences of disturbances in development due to lack of this hormone. The extreme form of thyroid deficiency is called cretinism. It is characterized by excess weight, pot belly, wide mouth, large tongue, thickened dry skin, and incomplete maturity of all tissues. As time passes it becomes evident that the child is hopelessly retarded mentally, the teeth are extremely late in developing, growth is slow, resulting in a grotesque, malformed imbecile.

Lesser forms of this deformity are common and may show all degrees of retardation in development. A second type of congenital thyroid deficiency is characterized by a long slender body and undernutrition together with a similar but less marked mental retardation. The milder examples of this deficiency are frequently considered to be normal until they enter school, at which time the mental retardation becomes apparent and the possibility of some developmental disturbance is first considered. At this point the diagnosis of thyroid deficiency can be made with considerable accuracy from a consideration of the birth and developmental history and the physical examination. The diagnosis can be confirmed by x-ray examination of the hands and feet which demonstrates a retardation in the calcification of the centers of ossification. This group of children shows a fairly uniform and characteristic disturbance in dental development.

In the infancy history, there is noted a delay in the eruption of the deciduous teeth. This is frequently attributed to rickets. When the teeth appear, they often erupt in the wrong order and show various disturbances in structure. This is most marked in the first molars in which the cusps may be entirely ununited, standing out in the gum tissues as four separate points with gum tissue present between the points. In the less severe disturbances

there will be seen a tooth with enamel deficiency between the cusps, a point which obviously affords an early opportunity for caries. The first dentition is poorly calcified, and there is a very high incidence of caries. These teeth are frequently irregular in size because of the fact of the abnormal time of their eruption. At this stage no deformity of the jaws can be determined. In the older children of this type one frequently sees disturbances in jaw development, but these conform to no standard type and are not uniformly present. It seems apparent that faulty development of the jaw is not due primarily to the thyroid deficiency but results mechanically from the malocclusion and faulty eruption of the teeth. If these anomalous jaws were directly the result of the thyroid deficiency, one would expect to find similar conditions in every child with the deficiency.

As the child grows older the physical disturbance becomes more marked; the condition of the teeth progressively deteriorates so that early extraction, particularly of the first molars, becomes necessary. The profession has recognized for years the importance of these particular teeth in preserving normal contours and in controlling the mechanics of jaw development. A thyroid deficiency is therefore an important factor in the production of these disturbances.

Our information regarding early pituitary deficiency is much less complete. One sees cases in which the child at birth is undersized but mature in tissue differentiation. Growth is slow, but uniform and symmetrical throughout. In these cases the eruption of the teeth occurs at the proper time; the teeth are well formed and well calcified but small, but not small in comparison with the size of the infant. Throughout the early years the slow growth continues, giving a midget individual with normal mentality and fine delicate symmetrical features, the teeth show normal resistance to caries and are in proportion to the size of the face. The pituitary deficiency of infancy apparently does not predispose to any orthodontic problem.

Upon reaching the age of puberty the subthyroid child frequently shows a premature development of the secondary sex characters and in the girl an early onset of menstruation. When this occurs one sees disturbances in the eruption of and shape of the permanent teeth, the maxillary central incisors are frequently overlarge, the lateral incisors being much smaller, and crowding and overlapping are common. The incisors may be very slow in appearing. Those teeth which are oversized are well calcified and resistant to caries. Those which are small are poorly calcified and prone to early disintegration. The canines may be entirely missing, may appear in anomalous position or may be distinctly undersized. The molars are frequently late in appearing and show the same faulty structure and incompleteness of development as was seen in the first molars. This incomplete union of the cusps results in early appearance of occlusal decay. These children show an inability to retain fillings so that in spite of adequate dental attention the molars are frequently lost at an early age.

This group of children presents itself commonly to the orthodontist, and in my series represents approximately one-third of the cases observed. One should understand that thyroid deficiency occurs in all degrees of severity. If marked, a severe degree of mental retardation is present and the dental

anomalies are marked. The degree of disturbance in the teeth obviously depends upon two factors, the severity of the developmental defect, and the quality of dental care that the patient has received. A poorly matured tooth which has been protected from caries by frequent and adequate attention will obviously survive in spite of the defect and will serve its purpose in preserving the dental arch. Such a tooth without attention will be readily destroyed, necessitating its removal and resulting in the characteristic mechanical disturbance which follows.

If these disturbances in dental development are due to the thyroid deficiency, one might reasonably ask whether thyroid treatment would cure the condition or not. The answer unfortunately must be in the negative. At the time that the tooth appears its development is nearly completed, and the administration of thyroid cannot be expected to correct the fault which arose during its maturation within the jaw tissues. If one is to secure the normal development of teeth in the hypothyroid subject, the diagnosis must be made while the tooth is in the process of formation, many years before a patient presents himself to the orthodontist. I would emphasize that in the proved cases of thyroid deficiency thyroid treatment has not improved the teeth which have already erupted and thyroid treatment should not be advised by the orthodontist with the expectation that it will correct these developmental conditions.

The orthodontist who recognizes this condition can be of great service in pointing out the thyroid basis because of the great value of thyroid treatment given at this age in increasing mental and physical efficiency. Long continued thyroid therapy has apparently been of some value in decreasing the tendency to caries and in improving the calcification of these teeth. The damage is usually so great at this stage, however, that the improvement in dental condition alone does not justify the treatment.

The observations regarding the teeth in thyroid deficiencies may be summarized as follows: The deciduous teeth are late in appearing, incompletely formed and poorly calcified resulting in early caries and their early loss from the jaws. The loss of the deciduous teeth, particularly the first molars, results mechanically in deficient jaw development producing orthodontic disturbances. The permanent teeth in thyroid deficiency are late in appearing, irregular in size and poorly developed. The molars show early caries because of faulty development. These factors together with those described for the deciduous teeth result in disturbances in occlusion and jaw development, again on a mechanical basis. If the defective teeth can be preserved, the jaws develop normally and the orthodontic problems are limited to those resulting from disturbances in size and position of the teeth.

Returning to a consideration of the conditions found in the pituitary deficiency we recall that during the prepubertal life there are no characteristic disturbances except slowness of growth of all tissues. As one approaches puberty the picture becomes more complicated. The normal increase of growth which should occur at this period may be delayed beyond the normal time; or instead of there being a uniform increase in growth, we may find increased growth rate in certain areas with delayed growth in others. This disturbance frequently manifests itself in the development of the jaws. One

may see an almost complete failure of the development of the mandible with normal development of the maxilla. The most common finding is the retention of the infantile facial proportions with the eruption of normal sized teeth. This picture produces marked crowding and irregularity in position. The condition is characterized by a facial appearance younger than the patient's age with a corresponding immaturity of personality.

Again one may find a relative overdevelopment of the mandible with a distinct prognathism and the resultant severe malocclusion. Occasionally one sees a right- or left-sided relative overdevelopment with a general facial asymmetry. In the development of these conditions the time element is an extremely important factor. The changes in bone growth occur with marked rapidity. A boy matures into a man in a surprisingly short period of time. Any disturbance in quantity of growth hormone at this particular period is capable of producing relatively important deviations from normal. At this period the development of the jaw bone is a much more important factor in the production of orthodontia problems than is the development of the teeth themselves. The shape, size and structure of the teeth have been determined before this alteration in the growth process has started. This factor accounts for the large group of cases in which the mouth at one examination will show no striking deviations from normal but reexamination a few months or a year later will show a well-advanced disturbance.

In the same age period one also sees cases of excessive growth hormone with generalized overgrowth of tissue. If this condition develops early, before any bone structures have completed their development, the overgrowth is symmetrical giving simply an oversized boy or girl who shows perfect body symmetry. The teeth in these cases are unusually strong, even, beautifully spaced and with no evidence of abnormalities.

If this excess growth hormone appears first after certain bone structures have completed their development, there results an irregular bony overgrowth depending upon the stage at which the excess hormone appears. The most common type observed is one in which the extremities continue to grow after the head and trunk have reached their maximum development, giving excessive length to the long bones of the arms and legs. In this type there is usually normal dentition. It is not uncommon to find continued growth of the bones of the face after the teeth have fully erupted giving wide spacing between the teeth and loss of mutual support.

One occasionally finds in adults and less commonly in children the presence of a pituitary tumor with the production of excessive quantities of growth hormone. In the adult this results in the condition of acromegaly. This is characterized by overgrowth of the hands and feet and mandible particularly but all tissues in the body take part in the overdevelopment. These cases usually present an extreme prognathism with spacing of the teeth and complete failure of occlusion. The same type of disturbance may occur with functional overactivity of the pituitary.

In an earlier part of this paper I stated that the maturation of the sex gland or gonad resulted in the production of a hormone which acted to check growth. This may be demonstrated roentgenographically by the closure of

the epiphyses. When the gonads fail to mature at the normal time, the growth hormone is able to continue its effect beyond the normal period. This results in disproportion in which the long bones again grow beyond their normal proportions. The condition is superficially similar to that seen in overactive pituitary cases. A failure of the gonad to mature is usually due to a deficiency of thyroid or of the sex hormone of the pituitary, so that these cases present evidence of a mixed glandular disturbance. If due to thyroid deficiency one will see the poorly developed teeth, the lack of calcification and early caries involving particularly the molars. Deficiency of the sex hormone of the pituitary as the cause of the gonadal failure does not specifically affect the teeth. From the standpoint of dentition, therefore, gonadal deficiency or hypogonadism does directly enter the problem.

If one were to summarize the effect upon the teeth of glandular disturbances occurring at puberty, one would find that thyroid deficiency affects primarily the teeth themselves resulting in the eruption of incompletely matured teeth, the incisors being uneven in size, the molars showing incomplete union of the cusps and early caries. The disturbances in the jaw bone in uncomplicated hypothyroidism at puberty are secondary to the disturbances in the teeth. In the pituitary deficiencies, on the contrary, the teeth themselves are normal in structure although perhaps small in size, but the jaw bones show disturbances in the development depending upon the time at which the deficiency becomes active.

This conception divides orthodontic problems into two groups, those involving disturbed dental development per se and those involving faulty bone development in the jaws. I believe that this distinction has already been made in the profession. I hope that this presentation of the endocrine factors involved will be of value in classifying the mechanism of the development of these disturbances.

In presenting a study of this sort the question of a new form of treatment is always raised. If the abnormalities present in your patient are due to deficient functioning of one of the glands, should not glandular treatment be prescribed as part of the corrective measures? I fear that I am not able to offer a panacea for abnormal mouth conditions. There is, however, something to be expected from glandular treatment in appropriate cases. I have said before that the deleterious effect of thyroid deficiency is exerted during the growth of a tooth within the jaw. If the diagnosis could be made at this stage, adequate thyroid treatment should result in correction of the developmental disturbance. Unfortunately the success or failure of this kind of treatment depends upon the recognition of the deficiency in the child of four to six years, an age at which no child is ever brought to the orthodontist. Thyroid deficiency should be suspected and ruled out, however, by every general dentist who sees the child of this age whose teeth present the characteristics which I have described. Suggesting a thyroid deficiency and demonstrating its presence or absence are of extreme importance, not so much from the standpoint of the teeth as from the fact that a lack of thyroid is one of the more important causes of retardation in mental development. Our expe-

rience in this group of retarded children has shown that the earlier the thyroid deficiency is recognized and corrected the better is the mental development to be obtained.

The patients whom we have seen as late as six years have shown on thyroid treatment the development of very excellent second dentition. Those patients seen only at eight years or older have developed the anomalies described when the permanent teeth erupted even though thyroid was administered. From this, one concludes that the administration of thyroid to children of twelve or fourteen years, as they usually appear in the orthodontist's office, cannot be expected to improve the mouth condition directly. The appearance of these characteristic disturbances should lead to investigation of the thyroid status even at the age of twelve or fourteen years because of the beneficial effect of thyroid treatment upon the individual as a whole.

The pituitary deficiency which becomes apparent about the time of puberty offers a much more interesting picture. The child at this age responds quite definitely to pituitary medication as far as growth and the production of sexual maturity are concerned. Because of certain limitations I have been unable to follow the effect of pituitary treatment in the large group of the clinic. In a smaller number of private patients I have seen very definite stimulation of growth of the jaw bone with widening of the arch such as occurs with the proper use of orthodontic appliances. If this can be shown to cure without mechanical aid, it would seem logical to fortify the mechanical treatment in this type of disturbances by the use of pituitary treatment. This kind of treatment would be limited to those children having undergrowth in general with particular underdevelopment of the jaw bones. The treatment indicated would be the desiccated anterior lobe pituitary in large doses or the isolated pituitary growth hormone when that becomes available for clinical use. The effectiveness of the treatment can be measured by the increased growth rate which is produced. One would be justified in assuming that the increased rate of growth of the long bones was also present in the bones of the face.

At the present stage of our knowledge it is impossible to prove or to disprove the value of this kind of treatment. In suggesting the use of endocrine therapy in cases of orthodontic problems I would emphasize that the tried and proved mechanical principles now in use should not be discarded, that proper orthodontic treatment is more imperative and offers a greater expectancy of successful result than does the use of endocrine therapy, no matter how successful. The mechanism which I have discussed offers an explanation of the abnormalities which you have been trying to correct. The use of endocrine therapy may assist you in certain selected cases, but in no sense may glandular treatment supplant the orthodontist after the patient has reached the age of puberty.

DISCUSSION

Dr. H. H. Turner, Oklahoma City, Okla.—Dr. Marinus has given us a very excellent presentation, and I readily agree with the general trend of his paper.

The thought occurred to me that perhaps (and I would like to know whether or not I am correct) children are being brought to the orthodontist these days at an earlier age than in the past, and also that the dentist in general practice through the preschool clinics

and also the children's dentist have an opportunity of observing these children very early in life, not at the age of twelve and fourteen years as formerly, but even down to the age of four and five years. That offers an excellent opportunity for the study of these endocrine conditions as they appear in the general dental make-up.

I believe it will not be long before you will realize these changes which occur in the mouth in these endocrine types, and that the results in the future will be much better than those in the past.

As Dr. Marinus told you, happily the thyroid child does respond to therapy, and in the examination of these preschool children, if a short history might be taken along with the characteristic dental observations made at the time, that they were very late in teething (of course you will note that in the four- and five-year-old), you can be of definite benefit to them.

I feel that all these children with orthodontia problems should at least have a general physical examination and especially an endocrinologic survey made at the beginning of the orthodontia treatment, because I believe the endocrinologist may be of definite aid in the successful treatment of these cases.

Dr. Marinus has described these various types so thoroughly that I see no need of continuing that part of it.

As he has said, the thyroid children have late dentition with irregular and even with many missing teeth which never appear, or which decay very readily, whereas the pituitary types as a rule have very beautiful teeth, in excellent position and of very excellent composition.

There is much to do today about calcium and metabolism. There is much we know about calcium and metabolism, and there is much we do not know. We do know that hyperparathyroidism does occur and that it does produce decalcification of the long bones and short bones of the body which accompany this condition, and that the teeth of these individuals are bluish and translucent. That is one of the diagnostic points in the cases we see with these children with multiple fractures. We note that the sclera of the eyes is extremely blue, as well as are the teeth, and they have a sort of translucent appearance. I am not prepared to say whether or not they decay very readily or whether or not they are soft because that has not been my observation, but I do know they are very blue and translucent. These conditions have been corrected by removal of the parathyroids.

As Dr. Marinus has said, I think in these cases it was due to parathyroid deficiency, and we used to feed these children parathyroid and also give them the very active hormone extracted from the parathyroid gland. This hormone is so potent that it is possible (it has been done) to decalcify the bones by giving it to a normal individual.

About four years ago several German investigators of this problem found cysts and tumors of the parathyroid glands, and upon removing these adenomas the patient got better. The bones became more calcified and were not so prone to multiple fractures. It was decided that instead of hypoparathyroidism we were really dealing with a hyperparathyroidism.

Another type which has been associated with calcium disturbance has been termed status hypoplasticus. We used that term for want of a better name, but personally I do not like it. These children, I feel, form a very definite endocrine type. They are the thin, undernourished individuals who are extremely nervous and present all sorts of psychiatric trends and distorted behavior patterns. They are childlike and obstinate; negativistic. You ask them a question and they pay no attention to you. They are very sordid at times, and merely a look or a word which would not disturb the ordinary individual throws them into a rage. They are the type that throw ink wells at country school-teachers, and also throw knives and forks at members of their families at the table. I have photographs of several of them in my exhibit.

These children, I believe, all present a very definite dental condition in that their central incisors are very wide and the canines are extremely blunt. They are not the regular pointed blunt, but a very blunt type of canine. They have a very high palate and ridge at the palatine juncture, with a torus palatinus which is quite evident. I believe you will be able to recognize many of these types. They do respond to proper treatment in the form of regulation of the calcium balance.

The Mongolian idiot is not accepted yet as a definite endocrine type, but the severe types of hypothyroidism sometimes verge into a type which is difficult to distinguish from the Mongolian idiot. I have seen cases which have been diagnosed as mongolism which were purely hypothyroids, and also vice versa. The Mongolian idiot's mouth, as a rule, has a very high palate and the gum margin is extremely wide. Sometimes it is three-quarters of an inch in width and then takes an abrupt angle upward. The teeth, as a rule, are widely spaced, and the entire set may be molars or they may be canines. Some of these children respond very well to therapy, but the majority of them do not. There is very little we can offer the true Mongolian idiot. There is another very characteristic thing, and that is the palatine ridge that is present in the Mongolian idiot. I should say it is present in 80 per cent of these cases, and it seems the more severe the case the more prominent the ridge. I have a very severe case in my exhibit in which this palatal ridge is perhaps half an inch deep and extends down to the palate.

You are to be commended for your interest in endocrinology, and I hope it will continue because I am sure we shall learn much from each other. But may I say just one word to you in the form of constructive criticism?

Very recently, in one of the journals of the orthodontic society, I noticed two articles pertaining to endocrinology and the specialty of orthodontia. In each of these articles reference was made and due credit given to two supposedly prominent endocrinologists. I shall not call them by name, but I want to say that these men have been very successful as manufacturers and as writers, but they are not very good clinicians and are not accepted by the medical profession as a whole. I believe if you had the opportunity of reading the reviews of their writings in the *Journal of the American Medical Association, Annals of Medicine, Endocrinology,* and other accepted scientific publications of the American medical profession, you would not quote from them so freely. I think it is our fault more than yours that this occasion has arisen. They are better advertisers perhaps than the rest of us.

This study of endocrinology is advancing with cinematographic rapidity, and many new discoveries are being made daily. Conditions and diagnoses and types which we accept today as facts may have to be discarded tomorrow. So let us tread this very fascinating field of medicine, and orthodontia, may I add, very cautiously and see what the morrow will bring.

Dr. Homer B. Robison, Hutchinson, Kan.—It is difficult to discuss this subject very intelligently. In fact, I have no knowledge of this, but I have prepared a few notes.

I was interested in hearing that the posterior lobe of the pituitary does not affect the teeth. I had rather supposed it did, because of the fact of the growth hormone affecting bone growth. That is at least an interesting point.

My observation has been that in gigantism the dental arches are much more regular than in acromegaly. The mandible is large in the acromegalic, and the maxilla and mandible are about the same in gigantism. I should like to know the differentiation between the acromegalics and true gigantism.

I was also glad to hear Dr. Marinus state the effect of the thyroid on the teeth. I rather suspected it would have some effect, but I believe he clarified that. We know that in cretinism the teeth are quite well formed in the fetus and will probably not be affected after their eruption, but I still think if that condition is corrected in the teeth, the buds formed after the correction will produce a much better quality of teeth.

Possibly some of you remember, but in reading Engelbach's works I was interested to note that sometimes after parathyroidectomy, if the intestinal tract was kept sterile, the patient did not develop tetany. I think Dr. Engelbach quoted some one, but I could not quote him at this time. I believe probably the other gentlemen could.

I also was under the impression that mongolism was due to a defective thymus. My observation has been that in the Mongolian idiot we find a small, undeveloped maxilla and quite a normal mandible. I should like to be corrected on that if I am mistaken. I

think I am right on that because I have examined a number of Mongolian idiots; not a number, because there are not a great number, but all I could find in this state and a number in New York state.

In cretinism I rather thought the arches were wide in many instances (I might have misunderstood that), high vaults with crowding of the teeth.

I was wondering if possibly we would not find that diet was more closely related to glandular deficiencies; and that if the diet were more closely observed instead of having so much organotherapy, it would not be possible to correct a great many of the deficiencies through diet rather than using organic therapy.

Dr. Turner brought up a few interesting points. I was glad to hear him state that it was up to the orthodontist and dentist to observe some of these conditions in their incipient state. Engelbach recently stated that many of these biglandular or plural glandular conditions are present in the infantile cases, though not so many, but more in the juvenile which manifest themselves later in the adolescent state, and if it were possible to recognize the condition it would probably be of great benefit to humanity. I wrote Cushing to this effect some years ago when I had some potential acromegaly cases, and he made the same statement Dr. Turner did.

I am not sure whether I have found the large incisors in parathyroid conditions. That is a very interesting point. I wondered if there had been any theory advanced as to why this condition existed, and also it is interesting to note he stated the lateral incisors were much more decalcified than the central incisors.

Dr. Carleton J. Marinus.—I am a little bit disappointed in the absence of general discussion. There is nothing I like better than a battle. I had hoped some one would get up and tell me I did not know anything about it.

I want to thank Dr. Turner for his remarks particularly. Perhaps we have been looking at this thing from a little different angle. I was trying to show you the common things, the types of glandular disturbance which represent the great majority of those that one sees in the study of large groups of children.

Dr. Turner brought out mongolism. Mongolism is extremely interesting, but it is a very rare condition. My own personal feeling is that it is a disease entity which is frequently complicated by hypothyroidism, but that thyroid deficiency is not the cause. If mongolism is complicated by thyroid deficiency, the correction of that deficiency obviously improves the prognosis but does not affect in any way the underlying mongoloid condition. The dental observations one sees in mongolism are therefore very frequently confused with complicating thyroid deficiency. There are certain things about the dentition of Mongolian idiots, however, which are just as characteristic of that condition as are the slanting eyes and the short, twisted little fingers.

Dr. Turner mentioned the hyperplastic type. As we see it at present, this is a rather uncommon type of glandular disturbance. Those cases I have seen which were severe enough that I could be certain of the diagnosis have been very small in number. That apparently is associated with an extreme disturbance in calcium metabolism, and it is to that group of cases Dr. Robison referred in error. It was not the parathyroid case which gave the large incisors; it was the hyperplastic type Dr. Turner mentioned. The parathyroid case does not show a disturbance in the size or shape of the teeth. The teeth in the overactive parathyroid case are blue. The sclera is blue, but the teeth do not show an excessive amount of caries. There is a distinction between a tooth with caries and one in which there is a generalized loss of calcium. The calcium-poor tooth in the overactive parathyroid case may not show any more caries than the average normal individual.

I perhaps left a misunderstanding in your minds. The posterior lobe forms the hormones which act in conjunction with the central nervous system to control various body processes. The growth hormone is not formed by the posterior lobe, but is formed by the anterior lobe, and the anterior lobe of the pituitary is extremely important from the orthodontic standpoint.

The distinction between acromegaly and true gigantism is that gigantism is caused by the growth hormone doing its work before puberty, but the overgrowth is symmetrical

and the body proportions are perfect. The dental development is symmetrical and the development of the jaws is symmetrical. In acromegaly the excess growth hormone carries on its work and appears after puberty, at which time certain of the bones have passed their time for normal development. Their epiphyses are closed and can no longer increase in length, so that the overgrowth which they show is asymmetrical and is not uniform, and in those cases there are disturbances in the proportions and relative development of the jaws.

Dr. Robison's question regarding the influence of other factors than the parathyroid upon tetany is well taken. It is known that we can completely remove the parathyroids from the dog and keep him alive indefinitely as long as we keep meat out of his diet, and that we can throw him into convulsions at will by giving him meat. So that other conditions in the gastrointestinal tract, and other factors in general do definitely influence the appearance of the state of tetany.

Dr. Robison's question regarding the relative development of the mandible and the maxilla in mongolism, I think, can be answered by saying that any difficulties he has found have been due to the fact that many of these cases were undoubtedly complicated by a thyroid deficiency, and he was trying to make a diagnosis on the basis of mongolism per se without recognizing the thyroid part of the disturbance.

His question regarding the appearance in cretinism is again one in which a straight answer is very difficult. Cases of complete cretinism, where the thyroid is entirely absent, are very rare. They are practically always found in our institutions. Cases of cretinoid deficiency or partial cretinism are very common. They will present differences in appearance and differences in dental development, depending upon the severity of the deficiency.

His question regarding the influence of diet versus glandular treatment is one which we at the present time are unable to answer definitely. There is unquestionably a relationship. Our best work upon the causation of goiter shows that high calcium diet in the presence of iodine deficiency uniformly produces enlargement of the thyroid. That can be done on any experimental animal, and I will point out that for many years we have been giving babies a high calcium diet fortified by viosterol in parts of the country where iodine intake is low. That possibly has a bearing on the magnitude of our thyroid problem at the present time.

I appreciate more than I can say the opportunity of coming to you for this little talk, because I feel there is a very large group of children growing up in this world who are handicapped by correctable glandular disturbance. The more interest we can arouse in the recognition of these deficiences and in the correction of these deficiences at a time when treatment offers prospect of real value, the greater our service to humanity. I hope you will go from this meeting with the idea that although these conditions I have described may be too late for correction they do indicate a need for glandular treatment.

DIAGNOSIS OF ANTEROCLUSION*

FRANK A. DELABARRE, BOSTON, MASS.

THE term diagnosis in this paper is extended to include not only the distinctive signs that indicate the classification as an anteroclusion in contrast with the other two types, but also an intimate description of all conditions present that make the case unique in its class, as a foundation of a rational line of treatment and prognosis.

An added reason for this procedure, aside from having a comprehensive and systematic approach to the practical application to cases, is the distressing situation arising when a patient is referred by another operator for attention, either emergency or continuation of treatment, without any data or instructions beyond the indefinite request to "use your own judgment."

I protest that such a course is eminently unfair to the patient at least, and is exasperating to the orthodontist, who is handicapped by the lack of the original models and case history.

Man is a bilateral animal with an evident symmetry of form and relationship of pairs of organs. This symmetry is never absolute but is close enough to permit efficient function.

Since function determines form, the most nearly perfect function results in the most perfect form, or conversely the best occlusion (functionally) must be that which is so arranged that its units conform to symmetry in form and arrangement.

Occlusion is the relationship of bilateral pairs of teeth to each other in the same jaw and, when opposed in function, to their antagonists in the other jaw.

Each tooth occludes with definite surfaces of opposing teeth. The measure of occlusion is the degree of functional efficiency. Symmetry of arrangement then is an attribute of good occlusion.

Variability in arrangement may or may not affect function seriously. If it does not, it may be classed within the bounds of a reasonable norm.

Slight variation may reduce functional efficiency to a marked degree; for instance a lingually occluding maxillary lateral may prevent any lateral excursion of the mandible. Gross variations are always malocclusion.

Diagnosis then must be based upon symmetry of form of the units and their relationships.

Granting a symmetry of *tooth* form we are concerned with the symmetry of the arrangement of teeth alone.

There is quite a wide variation of arch form of the human dentition without vitiating the type or the efficiency of function. It has more direct influence on facial appearance, which in turn depends largely upon heredity.

*Read at the Thirty-Second Annual meeting of the American Society of Orthodontists, Oklahoma City, Okla., Nov. 8-10, 1933.

The esthetic problems of diagnosis are omitted from consideration in this paper, except that we may expect to find gross disturbances of the hereditary facial pattern of any individual in those malocclusions that have become complicated with age.

The sagittal plane of the skull is the rational base from which to determine symmetry. The technic described was developed by Dr. A. L. Morse of Boston and has been used over a period of twenty-four years.

It is admitted that the landmarks used to locate the sagittal plane are themselves variable, and perhaps therefore the method should be abandoned, but we are dealing with a living organism subject to countless variations but still exhibiting bilateral symmetry to a high degree.

With a malocclusion it is probably true that symmetry decreases in the individual with age as the results of malfunction alter the form.

If that is true, then we can get a more accurate reading on the young child before malocclusion distorts the form seriously.

The points selected for locating the sagittal plane are the nasion and the median raphe of the palate. Registering a fine wire, held vertically in front of the face, on these two points with one eye, its relation to the median line of the maxillary incisors is noted and recorded as coinciding or diverging a measured number of millimeters to the right or left.

On the model, a pencil mark is made on the incisor to correspond to this reading, and another on the median raphe posterior to the premaxillary bones.

The Morse chart is a sheet of celluloid 70 millimeters square marked off into 5 millimeter squares, the lines being numbered in pairs starting from the slightly heavier horizontal and vertical midlines.

The chart is placed over the model with its median line registered on these two points, and the teeth are studied in their relations to the symmetrical anteroposterior and lateral lines.

Thus the symmetry, or asymmetry, of the arch curve or the positions of pairs of teeth is revealed in two dimensions, lateral and anteroposterior.

If anteroposterior symmetry exists, the classification is based on the same relations of the teeth when in occlusion according to Angle's classic method.

If there is an anteroposterior or lateral asymmetry, it must be ascertained what teeth are involved and to what extent, or whether the asymmetry is in the jaws and face. The latter is seldom demonstrable in the young patient and in the older more complicated ones may still be due to the influence of malocclusion or habits or other forces of environment and not to heredity.

Anteroposterior asymmetry may be of one tooth only or of all the teeth on one side.

The molars always drift anteriorly and the more posterior mate on the opposite side is in the more nearly correct relation to the jaw, although it too may have drifted, but there is no method by which it may be determined. Consequently the more nearly correct molar must be the basis of diagnosis.

Premolars or canines sometimes drift posteriorly, but seldom unless on the same side where there has occurred an anterior molar drift due to premature loss of deciduous molars.

The more normal side is the basis of determination.

The lateral symmetry is then determined and noted.

Study is then made of these two items in the mandible, the chart being similarly registered on points of symmetry projected from the maxilla, using the projection of the sagittal plane mark originally made on the maxillary incisor on which to register the median line of the chart. The other median line is then registered on the marks projected from the molar region of the maxilla. The readings are then made and noted.

When the mandibular central incisor line does not fall in the sagittal plane, there is indicated either a lateral drift of the incisors or an established swing of the mandible itself.

If it is of the incisors alone, the occlusion and the history of eruption will generally make it evident.

If it is the swing of the mandible, a lateral asymmetry of both jaws will be present *on opposite sides*, unless there is present a crossed bite. For instance, if the maxilla is underdeveloped laterally on the left, at an early stage function tends to swing the mandible toward the right, resulting in either a crossed bite on the right or a repressed lateral development of the mandible on the same side. This is a most curious maldevelopment with a very complicated line of treatment involving unilateral expansions until harmony is restored. It is rare to find lateral asymmetry occurring on the same side in both jaws.

Not until these points of symmetry have been carefully analyzed and noted can the classification be studied.

Where there exists a lack of symmetry in the anteroposterior direction, due allowance for drift and its amount must be made, visualizing the drifted teeth as being so many millimeters displaced and the diagnosis made on that basis, in other words, just as though you had actually corrected the drift of the teeth as the first step in your treatment to reduce the case to simpler terms.

Contradictions between the readings of the anteroposterior relations of the molars and of the canines or premolar often occur; this contradiction must be analyzed by the same method of visualizing the teeth placed in their true anteroposterior positions and the contradiction will disappear.

By these means of analysis of the "accidental" positions of teeth by drift, the problem is reduced to the basic facts and the diagnosis of a typical anteroclusion (Angle Class III malocclusion) is arrived at.

No mention is made of vertical malrelations, because of the lack of scientific data to establish a range of normality. The procedure used is that of Howard based on facial balance, a matter of the personal estimate of the operator. It is included in this method and is of value if corroborated by evident interference with function.

With the diagnosis of the classification completed there still remains the necessity of extending the inquiry to a notation of all the other incidental characteristics that make the case individual and recognizable from all other Class III cases. These are added to the already recorded data on the study of symmetry and in addition to the evidence presented by the x-ray pictures.

Etiologic factors are next in order whether proved or suspected, whether amenable to treatment or not, and include habits, muscle tone, missing teeth, etc., and as complete a check-up as possible on physical status to determine the capacity to grow and develop.

The line of treatment can now be determined because all known items of maldevelopment are recorded, and the detailed succession of steps for correction planned.

Prognosis can now be approached intelligently, and it is the acme of professional judgment to advise against any attempt at correction where the data render the prognosis unfavorable.

According to our present knowledge the great majority of deciduous dentitions present "normal" occlusion prior to the age of three. The first departures from normal growth and development are naturally small, and diagnosis at an early age is correspondingly difficult; this often makes it advisable to keep the case under observation, sometimes for a period of years before a positive diagnosis can be made. The relative importance of diagnostic signs should be considered under these circumstances, and of them all the lack of lateral development is the most frequent of all attributes of malocclusion.

If the Bogue Index is not acceptable it should be modified to a higher or lower level or applied to some other age or period. It is ridiculous to ignore the most common attribute of malocclusion. Even its suggestive value when added to other recognized attributes lends weight, and it should be included as an item of study at least.

The norm of the child's occlusion from the deciduous dentition stage up to adult life is a constantly changing thing because of growth and development and the addition of permanent teeth.

The age of the patient, the stage of physiologic development, and the sequence of eruption must all be considered in evaluating this study.

After the eruption of the first permanent molars, during at least a part of the period of mixed dentition, Angle's classical first molar diagnostic sign does not apply, and the second deciduous molar sign is the one to use. The reason for this is that the permanent molars are, in position and function, merely additions to the deciduous set. They are only in partial eruption which will not be completed until the age of transition to adult occlusion which is marked by a greatly accelerated vertical growth of the entire face and jaws, particularly of the ramus of the mandible. There is also a mesial migration of the molars themselves in the alveolus amounting to 1.5 mm. in the maxillae and 3.6 mm. in the mandible, accounted for by the same amount of difference in the anteroposterior diameters of the premolars compared to the deciduous molars. In migrating they assume the adult inclinations and come into their adult positions described by Angle, predestined by their cusp form and length which is the product of evolutionary changes dictated by changing functional demands.

The ultimate diagnosis in any case can be evaluated only on the basis of methods employed. Divergent diagnoses of any case can be rationalized only by agreeing on some one basic method.

DISCUSSION

Dr. O. W. Brandhorst, St. Louis, Mo.—Like the poor, the subject of diagnosis will ever be with us. So long as there are deviations from normal, our interest will ever be keen to obtain more light on this subject.

Men differ a great deal as to what constitutes diagnosis. For instance, in discussing a paper on orthodontic diagnosis, recently, J. Sims Wallace, of England, commented:

"We can take models, we can see whether the teeth have tipped forward or have been pushed forward by the coming into position of the molar teeth; we can look at the face and see whether it is pleasing to look upon or otherwise; we can see the normality of the occlusion with great simplicity; but in diagnosis, the primary thing that one wants to get at is why did it come about; what was the cause of the molar teeth drifting forward, and what was the cause of the irregular position of the teeth. Why was the mandible small, particularly in cases of postnormal occlusion? If we only diagnose our case anatomically, he did not think we could get much further with it. If, however, we diagnosed that something was wrong from the physiologic point of view, or that the dietetic habits of the child had been such as to preclude the possibility of a normal development of the jaws, then he thought we were getting a little closer to the type of diagnosis which was worth aiming at."

On the other hand, Dr. Strang, in his new text on *Orthodontia* says: "Diagnosis may be defined as the process of determining the disease or malformation, from which an individual is suffering, by deductions from the symptoms presented. Thus we speak of the physician diagnosing pneumonia, typhoid fever, talipes varus, or scoliosis. In medicine and surgery this is often a careful, painstaking, studious procedure because there are many diseases that have similar symptoms and careful distinction must be made. In orthodontia, however, there is nothing complicated about making a diagnosis, for the moment one has detected a deviation from normal occlusion and so determined that there is malocclusion, the diagnosis is complete. All steps and procedures from then on have nothing to do with the diagnosis but are stages of 'case analysis.'"

It seems logical therefore, that the essayist should define the scope of diagnosis, as presented here. He says, "The term 'diagnosis' in this paper is extended to include, not only distinctive signs that indicate the classification as an anteroclusion in contrast with the other two types, but also an intimate description of all conditions present, that make the case unique in its class, as a foundation of a rational line of treatment and prognosis."

The preliminary assumptions further laid down are also well taken, so that in our discussions, we are dealing not with "freak" complications, but with conditions which we expect to find in daily practice.

Dr. Delabarre has presented to us a two-dimensional plan of diagnosis. This plan is based primarily on the sagittal plane, which is determined by selecting a point on the median raphe of the palate and using the nasion as the other point, which two points connected, then determine the plane.

I have no criticism of either of these points. Both are as constant, I believe, as other points used. Neither do I doubt but that in the hands of an experienced individual, these two points connected with a wire, could be made serviceable in determining the sagittal plane. Like all methods, however, in the hands of the inexperienced, the accuracy of the resultant plane might be questioned. Most of us, after years of effort, are able to do things, at which the beginner fails. Certainly, twenty-five years of usefulness indicate satisfaction in results and merit every consideration.

The second plane, as I understand it, is made serviceable as a result of the first, or sagittal plane. It determines the deviations from symmetry, laterally or anteriorly, by means of the markings on the celluloid sheet, which is used to represent it. Here, again, the experienced eye will go far in determining the deviations.

That this method is of value, there is no doubt. Further, it has much to recommend it, but I should like to make a plea here for obtaining the third dimension. I can conceive of a condition, in the routine practice, where the maxillary teeth on one side would be in supraversion or in infraversion. I doubt whether this could be detected by the celluloid plane, and if this plane is not kept at right angles to the sagittal plane, the reading of deviations might not be sufficiently accurate.

The plea for the third dimension comes as a result of my experiences with Simon's method of diagnosis. I grant that many variations exist, but to date, I have found nothing that tells the story as well as the gnathostatic method.

The third dimension referred to here is the one that measures height or depth of the occlusal plane in relation to the ear-eye plane of Simon.

I am assuming that in the method presented here, the sagittal plane corresponds with Simon's median-raphe plane and that the celluloid sheet with its markings is analogous to the vertical plane of Simon, in that deviations forward or backward are judged by it.

Why not, then, add the third plane? In my mind it might tell a more complete story.

In an early statement, Dr. Delabarre says, "The esthetic problems of diagnosis are omitted from consideration in this paper, except that we may expect to find gross disturbances of the hereditary facial pattern of any individual in those malocclusions that have become complicated with age."

Without attempting to take advantage of this statement, or the essayist, I beg leave to say a few words about facial photographs. In my own practice, photographs, particularly the side views, play an important part in the diagnosis. We are all familiar with the type of facial expression that is associated with an anteroclusion, and also that this becomes more extreme as the deformity advances.

(Slide) The outline of the facial features follows to a great extent tooth position and arch relations as shown here, the lips following the outline of the teeth and bringing about the relation of the lips as a result of tooth position.

(Slide) Here we have a group of faces all lined up on the basis of the orbital plane and the horizontal ear-eye plane in proper relationship to one another. This represents what one might find in a group of children if one were to examine the children as they come and go in a school. On the basis of our statistics, we believe that at least one-half would present abnormal conditions. So, in explanation, you find every other one a normal, that is, an anatomically correct occlusion, although quite a variation in facial type.

If we study these faces by photography, as I am trying to bring out here, we shall note certain peculiarities that are associated with anteroclusion. The percentages of these deformities are based on the findings in my own practice in a group of one hundred cases as they came into my office. So the percentage that is presented here of this particular type of anteroclusion is that which presents itself in my practice, less than 5 per cent.

This case [indicating] presents somewhat the facial outline as we would see it in those cases where the mandible tends to come forward.

Another is this one [indicating] which I term an incipient anteroclusion. Age makes quite a difference in those two cases. This patient is eight years old and this one thirteen years.

It is that one point that I want to bring out in regard to the importance of facial photography as an aid in not only mesioclusion or anteroclusion, but in all types of cases; not that it is the last word, but it is an aid.

In those cases where there is doubt as to whether the condition presents an abnormal position or relation of the mandible to the maxilla, or a correct mandibular relation but a mesial shifting of the maxillary molars, a photograph may tell the story. My plea, therefore, is for photographs of all cases, and for the sake of simplicity, uniformity and scientific value, they should be photostatic photographs.

Another factor that should be considered in anteroclusion is the gonial angle. The tendency toward greater obtuseness than usual, of this angle I think, is a symptom in these cases. As the anteroclusion progresses with age, this seems to become more exaggerated. Like other symptoms, it may also be associated with other conditions, but is so constant in this type of case that it helps to identify and classify it.

The method used to measure this angle is the cephalometric one, first demonstrated to me by Dr. Lischer. It is done by adapting a soft lead wire over the posterior border of the ramus, over the angle and along the lower border of the body of the mandible, and then recording it on the history chart, where the angle is measured. It may also be done on the photograph or on an extraoral lateral radiograph.

The placing of the diagnosis of the case after these preliminary findings, into one classification or the other, then seems to become a matter of individual preference. The term accepted by the American Society of Orthodontists is anteroclusion.

Permit me for a moment to refer back to one of the first statements by the essayist, that "it is eminently unfair to the patient at least, and exasperating to the orthodontist," to refer cases without information as to diagnosis.

The most distressing factor in diagnosis is our terminology. Even if we were to agree today on the method of diagnosis, I doubt whether we could make ourselves understood, because we are not willing to adopt universal terms. It does not speak well, to say the least, for an organization like ours, to be so out of accord on terms, and their meaning. When terms are adopted, why not use them?

Differential diagnosis is not a simple thing. We have not yet reached the desired goal in it, but I venture to say that if we could all get together on it, there would be profit in it for all, and a lasting benefit would come to those whom we have the privilege to serve.

Dr. G. Hewett Williams, Chicago, Ill.—Not being familiar with the Morse technic or chart, I am reluctant to discuss this part of the paper; however, from the description given, I am convinced it is a valuable aid in diagnosis.

There is one statement in Dr. Delabarre's paper that I should like to emphasize by repeating: "The molars always drift anteriorly and the more posterior mate on the opposite side is in the more nearly correct relation to the jaw, although it, too, may have drifted, but there is no method by which it may be determined; consequently, the more nearly correct molar must be the basis of diagnosis."

Dr. Delabarre states, "Premolars or canines sometimes drift posteriorly, but seldom, unless on the same side where there has occurred an anterior molar drift, due to premature loss of deciduous molars." I would assume that this posterior drifting might be possible in the first premolar and canine, but only at the expense of a definite impaction or displacement of the second premolar.

In many anteroclusion cases, I believe the tongue has increased its muscular development to the extent that it is a contributing factor in this type of malocclusion.

Dr. Delabarre states, "According to our present knowledge the great majority of deciduous dentitions present 'normal' occlusion prior to the age of three." My clinical experience does not verify this statement. I believe his percentage is too high.

I have observed two cases of unilateral anteroclusion with a marked swing of the mandible to one side which produced a noticeable disfigurement of the face. However, when the patient opened the mouth a few millimeters, the mandible assumed a normal relationship to the median line of the face, which suggests that the trouble is with the relationship of the condyle to the glenoid fossa.

In cases of true acromegalia, it is generally considered that treatment is of questionable value, yet there are borderline cases which can be controlled by treatment. We have all seen just that thing happen. These cases, when treated early, seem to have a restraining influence on further manibular development. For this reason it seems logical that in all typical anteroclusion cases an early corrective effort should be made at treatment in an endeavor to arrest the development of the mandible.

Dr. Harry E. Kelsey, Baltimore, Md.—In the upper drawing you made there, Dr. Delabarre, I think you said that was to be diagnosed as a Class I case. Did you mean Class I or Class II?

You demonstrated a forward drifting of the molar, and you said it was Class I, but I thought you meant to say Class II.

Dr. Frank A. Delabarre.—Answering Dr. Kelsey's question, according to the molars it is Class I; according to the canines, Class II. Because of the forward drift of the molar it is Class II. The molar is a liar.

I am sorry I did not make myself clear in regard to the inclusion of vertical dimension in my method of diagnosis. I always include it, and I pay a great deal of attention to it.

I feel decidedly weak in the application of any knowledge to the diagnosis of vertical disturbances. I have tested out my ideas in conjunction with the ideas of other men, and I frequently find a difference of opinion between us as to whether the anterior teeth are in supraversion or whether the posterior teeth are in infraversion.

I have studied Simon's method, but I have never adopted it. He makes his diagnosis of vertical disturbance from the basis of the Frankfort plane, the eye-ear plane, but neither Simon nor any one else, so far as I know, has given us sufficient data to develop a range of normality of vertical growth beyond which any tooth would be vertically disturbed, not erupted far enough or erupted too far.

I am still studying the third dimension. I do not know enough about it, and that is the weak point in my diagnosis. However, I do make an honest attempt. But my conclusion in regard to overbite cases is that it is more frequently lack of vertical development of the posterior teeth instead of overdevelopment vertically of the anterior teeth. My treatment is based on that conviction, and I base my diagnosis on the question of facial balance.

Dr. Williams said his experience in regard to young patients before the age of three years was that there were a great many more malocclusions than I attribute to that age. That may be true, but you must remember that the dentition is not completely developed until the age of two and one-half, and before the age of three there is very little opportunity for that to develop in the wrong direction. Consequently, my opinion still is that the majority of age three cases present a normal relation of the teeth anteroposteriorly and laterally, although I do admit I find not rarely malocclusion beginning in these young patients, but the symptoms are not so far advanced.

THE CRISIS IN ORTHODONTIA*†

ALBIN OPPENHEIM, VIENNA, AUSTRIA

(Continued from page 144, February)

The uniformity of the direction of force is of the same importance to the achievement of the desired tissue changes as are the short intermissions between the individual applications of force, and the periodic treatment. Since the bone is extremely sensitive to influences and is always ready to react, each change in the direction of the force must disturb the transformation of bone once it has started.‡ These changes are by no means harmless and are of great importance to the permanency of the result. Results, such as are so frequently published, can be obtained fairly easily, but only the permanency of the result is of deciding influence.

My objection to the lingual arch, which extends from the molar to the incisors without any support, has always been that it is not stable. I have the same objection to the lingual springs that are not supported by bands or spurs.

Without such stability an *exact* result cannot be achieved. I do not doubt but that the nonsupported lingual arch with free springs is also able to change the position of the teeth, but the exact and *desired* change in position and the stability of the anchor teeth is frequently lacking. I fully subscribe to Mershon's statement: "If it were possible to obtain accurate data, I believe that today there is as much harm being done by the use of orthodontic appliances as there is good."

The harmful results are not only the result of the intensity of the force—since even extensive damage may eventually be completely repaired—but also of the changes in the direction of the force. The fact that each change in the shape and tension of the spring almost invariably brings about a change in the direction of force seems to be a marked objection to their use.

Gottlieb and Orban[5] have confirmed the statement that changes in the direction of force are responsible for the disturbance of the normal tissue changes. They state that some of the disturbances are due to the repeated change of the

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†Translated from *Zeitschrift für Stomatologie*, Nos. 7 and 8, 1933, published by Urban and Schwarzenberg, Vienna and Berlin.

‡Oppenheim[2]: "From the characteristic transformation of the bone which accompanies the movement of teeth, we can draw the conclusion that before any treatment is started, the kind and direction of tooth movement have to be determined very carefully in order to avoid a later change of direction once movement has been started. If such a change is introduced into the treatment, the necessary repeated transformation of the bone must necessarily interfere with the definite reorganization of the bone structure and is no doubt responsible for many failures."

Oppenheim[18] (Quotation from Dr. Angle's letter of May 23, 1929, to Dr. Oppenheim): "The remedy (for root resorption) seems to me clear, that is, as even and steady movement as possible in the *one* direction required. . . ."

Wilson[15]: "Tooth movement must be continuous in one direction."

Hawley[24]: "A movement, once it has been started should be continued; intermissions are permissible, but never a moving back in the opposite direction."

ligatures, which produced minute changes in the direction of pull and irregularities in the direction of force.

In addition to the changes in the direction, the actual intensity of the force is also supposed to be of great importance.

In the experiments of Schwarz[3] an attempt has been made to find definite figures for the intensity of orthodontic force. There are several objections to the validity of such figures. In the first place, the force exerted by a finger spring will depend largely upon its position on the surface of the tooth. If the spring lies on the tuberculum it will have a tendency to become displaced in an incisal direction; thereby the intensity of force will be decreased. On the other hand, if the force of mastication displaces the lingual arch or the individual springs in an apical direction, this will automatically increase the intensity of force, hence the necessity of cutting grooves in the teeth in Schwarz's experiments to stabilize the position of the finger springs. Schwarz's formula for the biologic limit of orthodontic force reads as follows:[12] "These experiments already show empirically that forces up to 20 grams intensity at the start still conform to the biological optimum, but that forces whose intensity at the start is greater, even

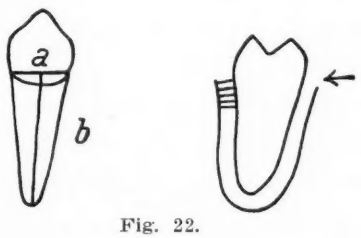

Fig. 22.

be it only slightly, are dangerous to the root, to say nothing of the intermittent character of such forces, which has already been mentioned."

Schwarz's formula for the permissible force is as follows: "The capillary blood pressure in man and in most mammalian animals is 15 to 20 mm. Hg per square centimeter, i.e., a pressure of 20 to 26 grams per square centimeter will just suppress the capillary pulsation. . . . the root surface of a fully developed mandibular premolar under pressure in lateral movement may roughly be estimated as being one square centimeter, whereby part of the pressure is taken up by the elastic soft tissues of the gingival tissues and the periosteum. . . . Taking into account a certain safety reduction we arrive, for single-rooted teeth, at a maximum permissible pressure averaging 15 to 20 grams per average root in tipping movement."

To this formula the objection must be raised that the area of the root surface of the mandibular premolar which is under pressure in labial movement is only about one-ninth of a square centimeter. If *a* in Fig. 22 indicates the average width of a mandibular premolar (4.9 mm.) and *b* the average length of a root (13.8 mm.), the approximate surface of the labial periphery of the root is about 0.34 sq. cm., or in other words, a little more than ⅓ sq. cm.

If the tooth is moved labially, practically only the upper third of its surface is subject to pressure; so the figure for the square area under pressure would have to be reduced to 0.11 sq. cm. The biologic limit of force would then have to

be reduced to about 3 grams. I realize that I am not justified in trying to give any definite figures for the force, *because my calculations are just as much a matter of conjecture as those of Schwarz.* In addition to these mathematical fallacies we know still less about the amount of pressure which is taken up by the tension of the fibers of the periodontal membrane on the side of pull and by the increased resistance of the tissues on the side of pressure as the force increases.

Therefore, it is impossible to give even approximately in figures the permissible total force which should not be exceeded. We must not forget that we are dealing with living tissues and that each individual has his particular individual reaction. Consequently, we cannot give any standard figures or data for any therapy. N. W. Kingsley expressed this thought as follows: "Recently the statement has been made that a tooth should be moved only a certain distance within a certain length of time in order to avoid complications; but it is quite evident that any mathematic formula for physiologic or pathologic changes is absurd."

Salamon[17] states: "We shall never be able to determine the force of the angle arch mathematically, because we are dealing with living tissues."

"Treatment in orthodontia cannot be worked out as a mathematical formula." (Mershon.[27])

"The reaction of the organism is not only different in individuals, but it is also different in the same individual at different times." (Winkler.[14])

A definite standard force is by no means the clue to success; on the contrary, in addition to the knowledge about the fundamental principle of appliances, which knowledge may be acquired by studying and reading, *the secret of success is only the extent of experience, the number of cases treated, and the number of successes and failures.* Particularly the latter are the best teachers for us. Orthodontia is neither a technical nor a mathematical science with definite formulas and regulations; orthodontia deals with living tissues which are subject to constant changes and for which there are no strict rules. Orthodontia is purely a science of experience.*

Another argument in dental literature deals with the position of the fulcrum. Some authors (Schwarz) claim that the fulcrum is located in the apical third of the root, others at the alveolar margin (Bauer and Lang[29]), and still others at the apex. However, sometimes one author has changed his opinions so rapidly that it is difficult to decide just what his latest opinion on the subject actually is. Schwarz[9] in 1928, stated: "A ligature producing gentle force will gradually tip the tooth in such a way that the fulcrum is located at the apex. If the same ligature is applied in the same place and in the same direction, but with greater force, the fulcrum is located farther crownward."

In 1932, Schwarz[12] comes to the following conclusion: "Even a weak force can tip a tooth inside its alveolus around an axis situated above the apex. The comparatively small displacement of the apex nevertheless brings about slow

*Oppler:[28] "In the use of our orthodontic appliances we have to consider the constitutional factor, and therefore, we are still working in the dark as far as the intensity of force is concerned, despite the data given by Schwarz."

changes in the structure which are by far surpassed by the marginal changes, so that in favorable cases the apex can remain approximately undisturbed."

I have again proved the fact that the fulcrum is located at the apex, and I stated in 1911[2] and again in 1929[18]: "Under the influence of gentle forces we find that the bone is resorbed on the side of pressure by osteoclasts, while new bone is being built on the spicules on the side of pull. These changes can be found extending almost to the apex, which indicates that the crown does not deviate in an opposite direction from the root." (See Figs. 3 and 15 of this article.)

The results of Gottlieb, Breitner, and Johnson can be explained in only one way: The reason these authors found a deviation of the apex is that they worked with *very strong forces;* thus their findings corroborate Schwarz's conclusions, who also has worked with excessive forces.

As far as the book of Gottlieb and Orban[5] is concerned, the fact that excessive forces were used is indicated in the very title. Breitner[31] has restricted the application of his findings in animal experiments to man by stating: "It is known from orthodontic practice that teeth are tipped much less with very gentle forces and very slow movements." Johnson, Appleton and Rittershofer[32] also used excessive force in their experiments, since their springs, according to the examination by Dr. Irish Pittsburgh, exerted a *continuous* force of 64 grams for twenty-six and forty days. This is a very great force, especially in view of the fact that it was continuous, and necessarily would bring about a deviation of the apex.

Schwarz quotes Johnson as proof of the correctness of his own statement that in *biologic treatment* with continuous forces the apex always shows an excursion in the opposite direction of the crown. But although Schwarz worked with much less force than Johnson, he found necrosis of the periodontal tissues and the presence of deep resorption in the dentin, which indicates that his force also was excessive.

The fulcrum in tipping movement is located at the apex, if such gentle forces are applied that bone resorption can keep pace with the movement of the tooth.

If the force is so strong that on the side of pressure there is contact between root and bone, then this point of contact will of necessity act as the fulcrum, and the apex must deviate in the opposite direction of the crown. Whenever this condition is found, it is definite proof that the movement has been carried on faster than the bone on the side of pressure could be eliminated by resorption. *Since all forces, even if in our opinion they are as gentle as possible, are still greater than the forces of natural growth and bone development, the rule requiring the gentlest intermittent forces, the use of intermissions during the active period of treatment, and the elimination of continuous forces cannot be overemphasized.*

This opinion is supported by a statement of Korkhaus:[30] "Strange as it may seem, we have not yet seen too weak forces in orthodontia, because even the most gentle force brings about some form of reaction; the least amount of force has not yet been determined."

My findings have also been corroborated in the study of a human tooth following orthodontic treatment, which was published by Herzberg.[33] He too found near the apex on the side of pull "newly formed bone arranged in the general direction of the fiber bundles of the periodontal membrane in this region." Gentle forces had been used, and consequently the apex showed no deviation.

Mershon[22] discussed the problem of tipping movement in many of his papers. He considers the tipping movement of a tooth as an evidence of too rapid orthodontic movement. Under physiologic conditions the point of entry of the blood vessels and nerves at the apex is never disturbed. Regardless of the changes that may occur in the position during the physiologic processes of growth and movement, the apex will remain stationary. "The tipping of teeth is only an evidence of one's inability to handle a delicate appliance and an expression of one's lack of knowledge of growing and developing processes." (Mershon.)

The correctness of my opinion can be shown not only by the photomicrographs (Figs. 2, 3, and 15) of this article but also by a simple experiment. If it is true—and we know it is true—that bone reacts to the gentlest force by resorption and thus seems to recede from the force, then the root may be represented by a stick which stands with one end on a table and the other end of which is moved laterally without meeting any resistance during this movement. Then the lower end of the stick will remain in its place without any deviation *in the opposite direction of the upper end.*

All authors have agreed that experiments on models or mathematical formulas cannot prove the position of the fulcrum of the root. Whether Schwarz and other authors used soft plaster, rubber, soft clay, or any other plastic material for their experiments to prove the excursion of the apex in a direction opposite to that of the crown, *they all overlooked the important fact that the changes in this dead matter cannot be compared with the changes in the living bone, which reacts to the gentlest stimuli and the condition of which undergoes basic changes as soon as any force is exerted upon it.*

If the movement of the teeth is not faster than the transformation of the bone can take place, in other words, if the tooth does not meet any resistance in the direction of its movement, then the changes in bone by no means correspond to those produced experimentally by Schwarz.

The fact that Schwarz considers the excursion of the apex in a direction opposite to the direction of the crown as a correct procedure in orthodontic tooth movement proves in itself that he has used too strong forces. He also states: "Any force that displaces the apex must at first destroy the apical fibers which are the natural anchorage of the apex."

If teeth have inadvertently been tipped by gentle forces during orthodontic treatment in such a way that there is no deviation of the apex, then function and other natural forces will gradually straighten the teeth and restore them to their normal position as soon as the orthodontic appliance has been removed. If, however, the apex has deviated, if the teeth have been tipped too rapidly and extensively, then natural forces will not be sufficient to restore the teeth to their

normal position, and orthodontic procedures will become necessary to correct their position, which will necessitate a change in the direction of movement and risk the danger of root resorption.

There can be no doubt but that in orthodontic treatment displacement of the apex opposite to that of the crown is not a biologic process.

In discussing Johnson's animal experiments,[32] Boedecker expressed the following opinion concerning the difference in the findings of Johnson (excursion of the apex) and my own findings (apex stationary): "Why this should be so is difficult to say; but, if we think of the matter logically, we would suppose that Oppenheim is correct, that it was a single-arm lever, and I believe the answer to the question is the degree of pressure used in moving a tooth. . . ."

Stallard[34] has expressed the opinion that I am not justified in drawing conclusions from my experiments as to the changes in man, because I did not move teeth from a wrong position to a correct one, but from a correct position to an incorrect one. I have already answered this criticism by saying that there are no monkeys with malocclusions that can be corrected. Furthermore the recent investigations of Herzberg[33] have shown that the findings in human teeth are analogous to those in monkeys.

A basic difference now between the various orthodontic schools is their attitude toward the problem whether continuous or intermittent forces should be used.

Many investigators, among them prominent physiologists, have stated that development and general growth are not continuous, but intermittent processes. Also, for the structural arrangement of the jaw, intermittent forces are of paramount importance, that is, the effect of occlusion and mastication. If nature works with intermittent forces and if the principle of the best form of treatment is imitation of nature, with what justification has intermittent orthodontic treatment been called "unbiologic"?

The question whether intermittent or continuous forces are the best for orthodontia is perhaps best expressed in a letter written to me on this subject by Professor Salamon of Budapest. He states: "As far as the problem, 'intermittent force—biologic action,' is concerned, one thing is certain: it has never been *proved* experimentally that intermittent forces are 'unbiologic.' This has only been *stated* in order to support the assumption that continuous forces are 'biologic.' In my opinion the latter statement, too, has *never been proved* but has only been broadcast as truth. I think I can characterize this problem as follows: there are no 'biologic' or 'unbiologic' appliances or methods, *but only 'biologic' or 'unbiologic' orthodontists.* With every appliance one can work biologically as well as unbiologically. I do not think that this problem can be decided histologically, and Schwarz's theory of capillary pressure also seems to be open to criticism."

In none of the textbooks of orthodontia which have appeared within the last few years do we find proof of the statements contained in them by a demonstration of *permanent* results (Dewey, Gallavardin, Herbst, Izard, Kantorowicz, Korkhaus, Kranz, Lischer, McCoy, Oppler, Pfaff, Quintero, Simon, Walkhoff, and Winkler). I do not include Angle and Case in this list, because I have been

unable to determine whether the cases showed by these authors are permanent results. *It is my definite opinion, which I have expressed in the early part of this paper, that the condition present at the time when the appliances have been removed cannot be considered a successful result, and that only the permanency of these results (no relapse after many years) is the deciding factor of the decision: success or failure.*

I neither deny the merits of any method nor emphasize the use of one particular method; I have tried all new methods and appliances of the past years with varying results, and I do not hesitate to accept improvements of old methods, as long as these improvements are sufficiently justified by clinical results. But the permanent results that have been reported so far by the advocates of the new methods are so scarce that I have seen no reason to discontinue my method of treatment, as dictated by the findings in my animal experiments; the permanency of my results warrants this persistency.

There is no "modern" and no "out-of-date" orthodontia. There is only an orthodontia which is successful or one that cannot report permanent results.

The repeated quoting of commonplaces, such as biologic reaction only with continuous forces, the danger of osteoid in intermittent forces, or the appliance which causes only pressure, should at last be discontinued. This does not contribute to the progress of orthodontia.

CONCLUSIONS

My conclusions of 1911 do not need any modification. All I can do is add some points to them and enlarge upon them in several respects:

1. The histologic changes which were described more than twenty years ago as the result of the activity of osteoclasts and osteoblasts under the influence of gentle, intermittent, elastic, orthodontic forces still retain their validity today. The same is true of the reaction of the tissues to strong forces (orthodontically speaking).

2. The animal experiments carried out in fully developed, intact deciduous teeth are equivalent to the experiments on fully developed permanent teeth. The bone transformation which is produced by forces of known direction is so characteristic that it can never be confused with any changes (shedding) which might be found in deciduous teeth that were not subject to such forces.

3. The influence of masticatory function is a factor which helps our orthodontic procedures. This principle, laid down by Angle, applies to the properly used labial arch just as well as to the lingual arch.

4. The Angle arch (pulling force) can work biologically just as well as the lingual arch (pushing force). In both cases the orthodontist only is responsible for the kind of result obtained.

5. Besides the short intervals resulting from the use of intermittent forces, our orthodontic cases are often markedly benefited by long intervals of rest during the treatment.

6. General growth and development do not take place continuously, but periodically. The stimuli which are constantly acting upon the jaws during growth and development, namely, the forces of mastication, are of decidedly intermittent character.

7. *Only the gentlest, elastic, intermittent forces, acting always in a uniform direction, should be applied in practice; such forces give the tissues time and opportunity to recover from the orthodontic forces which, under all circumstances, are too strong if compared to the natural forces of growth and development.* Only after the use of such forces, during the interruptions of the treatment, can osteoid form on the side of pull, can there be the new formation of periodontal fibers and their attachment to the bone on the side of pressure, which processes prevent the loosening and soreness of the tooth and restore its resistance to masticatory forces. Firmness and absence of soreness during treatment are the clinical criteria for properly gauged and properly applied forces.

8. A further rule of paramount importance for the undisturbed development of the tissue changes is the absolutely stabilized position of the appliance, in order to avoid jiggling and changes in the direction of the force. A change in the direction, once treatment is started, should be avoided if possible because, as I have already emphasized in 1911: "From the characteristic transformation of the bone which accompanies the movement of teeth, we can draw the conclusion that before any treatment is started, the kind and direction of tooth movement has to be determined very carefully in order to avoid a later change of direction once movement has been started. If such a change is introduced into the treatment, the necessary repeated transformation of the bone must necessarily interfere with the definite reorganization of the bone structure and is no doubt responsible for many failures."

9. If strong forces or sudden movements are used, the periodontal membrane is damaged by hemorrhages, tearing of fibers, and disturbance of circulation to such an extent that it can no longer react normally to mechanical stimuli. A periodontal membrane that has undergone such pathologic changes requires a long time to regain its normal physiologic properties and its power to react to functional stimuli. Rapid movement and the use of strong forces do not lead to more rapid progress in the treatment, but rather to the contrary.

Not only the bone reaction is disturbed by strong and rapid forces, but also the resistance of the cementum is lessened by the disturbed circulation, and thus the cementum shows a definite disposition to resorption.

Still another factor speaks against rapid and forceful orthodontic movement. After the force has been discontinued, a tooth that has been moved slowly may return to some extent toward its previous position; but it will never go back entirely, because during the slow orthodontic movement a transformation of the bone has taken place which will hold the tooth in its new position. This transformation does not take place in rapid movement.

The thickening of the alveolar bone plate, which always occurs under the influence of gentle forces of pressure and pull, accounts for the observation that anterior teeth may be moved labially over a great distance without danger of destroying the very delicate labial bone plate. Hence the rule that if considerable resistance is met during treatment, we should not increase the force, but merely prolong the time of the action of the force.

Impatience is the greatest enemy of the orthodontist.

Prolonged use of continuous forces has the same effect as the use of strong forces.

10. The tooth represents a single-arm lever with the fulcrum at the apex. In my specimens I could find along almost the entire length of the root the tissue changes produced by orthodontic forces, but with the most marked changes near the alveolar margin and the least marked near the apex. The bone immediately surrounding the apex does not show any changes. The bone on the side of pressure cannot act as a fulcrum for the tooth, because this bone is in a state of transformation.

If very gentle forces are applied, there will be only a side of pressure, but not an area of pressure. If an area of pressure develops, then the tooth is transformed into a double-arm lever, and the apex must necessarily deviate in the direction opposite to the crown. This forced displacement of the apical foramen is a pathologic process.

11. The osteoid formed during the intermissions is not capable of harming the cementum, as has been claimed by some authors, providing gentle, intermittent, elastic forces are used.

12. Occasional small resorptions of the cementum are without significance, since they are almost invariably repaired by a reparative deposition of secondary cementum.

13. There is no such thing as a definite amount of force which could be used for all cases and which at the same time would represent an optimum for all cases.

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(To be continued)

SOME OBSERVATIONS ON ORTHODONTIC DIAGNOSIS*

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THE title I have taken for this paper might at first view suggest that I had some theories of my own to bring forward; this is not so. I merely propose to give some particular points that have impressed themselves upon me during the last ten or twelve years, and "Orthodontic Observations" would perhaps be a better heading.

At the outset I should like to offer my thanks to Professor J. C. Brash, of Edinburgh University, for his masterly analysis of all work recorded on the subject of the etiology of irregularity and malocclusion of the teeth, and for his summing up of the present position, given in a publication of the Dental Board of the United Kingdom.† The student is now spared the necessity of reading hundreds of articles on this subject, all the matter required being at hand in Dr. Brash's very interesting and readable volume.

At present I think we have to assume that the etiology of orthodontic defects, other than those of local and obvious origin (such as the provision of too few or too many teeth), is still an uncertainty. There are many theories, but the door is not yet widely open to us. Indeed I incline to the view that a good many, even of those that have been assigned to local causes, should be taken as unproved.

Like most others, my orthodontic education and practice began with the classification formulated by Edward Angle.‡ I think we are all agreed that this arrangement has been a very useful stepping-stone for us; for one thing it definitely draws attention to "arch relationship," an important matter that was likely to be passed over before this, and, with its great simplicity, gave us a common language at a time when some code was badly needed. It might now be discarded in the light of our present knowledge, one reason being that it exceeds its duty in suggesting by implication certain lines of treatment. Incidentally (though this is a minor point), I have myself never been able to see the justification, or the necessity, for the subdivisions of Class II and Class III. In my own observation I have found that where the teeth of one side of the arch

*Transactions of British Society for the Study of Orthodontics.

†The Ætiology of Irregularity and Malocclusion of the Teeth. J. C. Brash, Dental Board of the U. K., 1931.

‡Classification of E. H. Angle. 1899, based on relation of first permanent molars.

Class I.—Normal mesiodistal malocclusion of anterior teeth only.

Class II.—Lower distal. Retrusion.
- Division 1. Protruding incisors. Mouth-breathers.
  - (*a*) Bilateral.
  - (*b*) Unilateral.
- Division 2. Retruding incisors. Normal breathers.
  - (*a*) Bilateral.
  - (*b*) Unilateral.

Class III.—Lower mesial. Protrusion.
- (*a*) Bilateral.
- (*b*) Unilateral.

are in correct relationship, the other being abnormal, this has usually been brought about by a "cross over bite" in order to obtain functional occlusion. This state has of course to be differentiated from those frequent cases where the posterior teeth of one side have traveled forward, following on loss of the deciduous molars or canines. One is able to confirm that the mandible has swung over by noting that the maxillary and mandibular centers do not correspond.

For some years now it has been my habit when examining an orthodontic case to remind myself that there are three conditions that we are called upon to treat, either separately or in combination, viz.: (1) tooth position, (2) arch farm, (3) arch relationship, and carefully to analyze the case on this basis. This is, of course, reminiscent of the classification formulated by Sir Norman Bennett, or, rather, to the anatomic basis of that classification.* It will be noted that whereas Angle's classification only takes account of arch relationship in an anteroposterior direction, Bennett's is more complete, as it emphasizes this relationship in the lateral and vertical directions as well.

A short time ago Mr. A. T. Pitts in an interesting paper suggested that certain modifications be introduced into Angle's classification. I am hoping that he will modify his views and recommend for general acceptance of the working dentist this very excellent *aide-memoire* of Bennett's.

The next step is an attempt to discover the origin of the disability in the particular case under examination. The surgical and common sense method then is to treat or remove the cause, but when we cannot be agreed as to what the cause is, it is reasonable to treat the symptom, or condition, as we see it, for as Mr. Harold Chapman reminds us, there are many cases of malocclusion which we are able to treat successfully without knowing their causation. But this remark of mine needs qualifying; the symptom that needs treating is not necessarily the one that the "man in the street" notes, although this is not infrequently done.

Now I believe that what might be termed the "mechanical factor" in causation has, in the past, been overemphasized. By this I mean that the various attractive theories, such as adenoid overgrowth and enlarged tonsils, by bringing on mouth-breathing, once placed high on the causation list, should occupy a much humbler position; the same applies to various sucking habits. By this I do not mean that the "mechanical factors" do not play their part; for from our knowledge on how tooth movement can be brought about by the continuous pressure of light appliances, it is obvious that thumb or finger, applied over a long period to the teeth will bring about some movement. I do consider, however, that in the past we have unduly stressed the "mechanical factor." If, by sturdy cross-examination of the parent or the patient, we were able to wring the admission that a comforter had been used, or the thumb had been sucked, we sank back complacently, sure in the belief that we had probed to the very root of the matter! Of recent years, having had the opportunity of seeing a great

*The anatomical basis of Sir Norman Bennett's classification.
I.—Abnormal position of one or more teeth.
II.—Abnormal formation of a part or the whole of either arch.
III.—Abnormal relationship between the maxillary and mandibular arches.
1. Vertical. (*a*) Open bite. (*b*) Close bite.
2. Anteroposterior. Prenormal or postnormal (with reference to relation of mandibular to upper arch).
3. Lateral. Labial or lingual occlusion.

number of children and infants, it has been brought home to me that many of these typical "mechanical factor" cases themselves denied such an origin, and when the parent assures me that these factors do not exist I am constrained to believe her. I mention this because it is not the general attitude—I note a writer in a recent issue of the INTERNATIONAL JOURNAL OF ORTHODONTIA, discussing cases having correct anteroposterior relation of the arches with protruding maxillary incisors, says:

"The patients or parents may insist that they do not breathe through their mouths, but if they were not mouth-breathers with abnormal muscular action, this type of malocclusion would not exist."

In considering cases involving abnormal arch relationship in the anteroposterior direction, my own views appear to have changed in recent years; now I look upon postnormal occlusion as being prenatal in origin, though in some cases the hereditary make-up has included a narrow premaxillary region whereby the mandible is prevented, by the position of the maxillary canines, from coming forward. Likewise I consider cases of prenormal occlusion to be prenatal in origin, but these cases are aggravated very frequently by the patient thrusting forward the mandible in order to obtain a functional occlusion.

My own observations do not support the hypothesis that these prenormal cases are caused by the thrusting forward of the mandible in order to gain relief from enlarged tonsils.

In examining numbers of mixed dentures one notes how frequently there has been little or no change in size between the dental arches of the two-year-old child with its complete deciduous dentition and the child at approximately seven years of age when the much larger permanent teeth are in process of replacing them.

One should remember that the size of the dental arches serves as an index of the amount of bone growth of the jaws and is dependent on that growth. Once the opposite view was held, that the presence of teeth stimulated bone growth.

It seems that the periods of bone growth vary very much in intensity and time of occurrence in different individuals. Whatever its cause, this variability, I believe, to be one of the most frequent conditions in the early history of many of our orthodontic cases. The condition of irregular growth in the two- to seven-year age period gives us in my observation, when combined with abnormal anteroposterior arch relationship, some of our most involved cases.

It is observed in examining older children that with the eruption of the permanent teeth the earlier orthodontic history becomes obscured. We have long realized that similar orthodontic conditions may have different origins, but, I believe, the reverse also holds—that the earlier history of many very dissimilar cases is the same. Taking for example a denture where the permanent incisors are due to erupt, assuming that these cannot come into alignment between the deciduous canines owing to insufficient bone growth—then I believe that the position these incisors eventually come to take in the dental arch is just fortuitous.

In summing up the results of my observations in a few words I would say that abnormal arch relationship in the anteroposterior direction is prenatal in

origin influenced by heredity, and as Sir Arthur Keith tells us, possibly part of an evolutionary tendency in regard to the ever increasing condition of post-normal arch relationship. Professor Brash reminds us that etiology and causation though usually employed by us as synonyms are not the same thing, and I would say that the causation of most of our cases—excluding anteroposterior arch relationship—is variability or irregularity in bone growth. The various causes of this irregular bone growth I can only conjecture and guess at—I do not know, though I am inclined to rate the hereditary factor fairly high.

Some years ago I read a paper to a group of dentists entitled, "Simplified Orthodontics." I propose ending these notes with the peroration of that paper as it may serve to lend some practical application to my remarks—I then said:

"I am convinced that the future lies in concentration more on the diagnosis and etiology of orthodontic defects than on the ability of pretty pieces of mechanism to move teeth.

"I have formulated certain rules for myself, and elementary as they are, I hope that you will not think it impertinent my mentioning them to a gathering such as this:

"(1) Never express an opinion on a case without examining carefully both the patient and the dental casts—these two are complementary one to the other—one notes the facial lines in the patient and one sees better the occlusal relation of the teeth and dental arches in well-made plaster casts.

"(2) In undertaking treatment of a case always keep for reference the plaster casts of the original condition.

"(3) Appreciate that most cases fall under two headings:

(a) When the condition is brought about by early loss of the deciduous teeth and consequent 'drifting' in position of the permanent.

(b) When the disability is a symptom of defective bone growth (and one could add also a combination of these two).

"(4) Do not too readily ascribe the majority of cases to habits.

"(5) Remember that we are called upon to correct three conditions, either separately or in combination:

(a) Tooth position.

(b) Arch form (or shape).

(c) Arch relationship.

"(6) In using removable appliances remember that it is very seldom necessary to 'cap' or 'gag' the bite—vulcanite plates made to cover the teeth are clumsy and dirty, and by upsetting the occlusion of the back teeth may do positive harm. When told that it is necessary to 'prop the bite' in order to move a tooth over the bite, remember that during the greater part of the twenty-four hours the teeth are not in occlusion.

"(7) Whatever type of appliance is used—whether fixed or removable—let it be simple. That is to say, do not attempt to do too much with any one appliance. The efficiency of any apparatus depends on its anchorage, and when stresses are applied in varying directions this anchorage becomes unstable.

"(8) Remember that we are dealing with a growing child and endeavor to look ahead and visualize what the orthodontic future will be. Certain types

of cases do improve without treatment; indeed, a cynical confrere of mine once said that our most successful cases are probably those which Nature would have corrected without our aid."

DISCUSSION

Mr. Harold Chapman said that Mr. Samuel had brought forward a number of interesting points. He had questioned the value of dividing Classes II and III in Angle's classification into unilateral and bilateral. He had rather gathered that Mr. Samuel seemed to think that these were not two different entities. For his own part he had never been able to arrive at any conclusion on the subject, but he did not think he could quite agree with the view Mr. Samuel had taken. It did not seem to him that, generally speaking, it was a matter of the mandible swinging over, though he thought that happened in a few exceptional cases. The mandibular arch was prevented from moving forward in some way; it seemed that in some cases the unilateral condition was associated with excessive overbite and this might be a causal factor. Nevertheless, he was compelled to admit that it was a matter on which he felt diffident about offering an opinion. Of course, if the etiology of the condition could be arrived at, it would prove very helpful in treatment. He wished to thank Mr. Samuel for so exhaustively covering the ground of etiology and diagnosis.

Miss Smythe said that with regard to the subdivisions of so-called Class II cases, it had been her experience with such cases that a great number of them did not either fall into the fully recognized subdivision 1 or subdivision 2 at all. There was neither protrusion nor retrusion of the incisors. These cases should have a class of their own, in her opinion.

Mr. Harold Chapman said his own feeling was that in Division 1 of Class II the maxillary central incisors were practically always in their correct position; it was very rare that those teeth were too far forward. He had pushed them back at times, and on nearly every occasion on which he had done so he had had to let them come forward again. Now he made sure that they were not too far forward before he began. He would rather like to lay down that in Class II, Division 1 cases, the maxillary incisors were not too far forward, but were correctly placed. At any rate, he judged the cases in which they were too far forward did not represent more than 10 per cent.

Mr. A. L. Packham asked whether Mr. Chapman was referring to the apices of the teeth or their cutting edges.

Mr. Chapman, in reply, said that he would hedge on that question, and say he referred to the center of the crowns. He believed the case which Mr. Packham had in mind was one in which the crown was certainly inclined forward or in proclination.

The President said that the subject of diagnosis was obviously one of very great importance. Mr. Samuel rather suggested that Angle's classification was obsolete, but here the speaker was not sure that he could agree with him, because it seemed to him that nearly 80 per cent of all the cases referred for treatment were irregularities in the anteroposterior relationship, which was covered by Angle's classification, and that only a minority of cases were really abnormalities in the vertical or in the transverse plane. Therefore it seemed to him that Angle's classification still had a very useful place as being a convenient way of describing these forms of arch relationship. Mr. Samuel had appealed to him to withdraw a somewhat hazardous contribution which he, the President, had made to this subject. His contribution was to suggest the transference of the Class II, Division 2 case to Class I, and to speak of it as Class I, Division 3, because it had seemed to him that there one had a primary defect in the maxilla which called for treatment, and that the posterior relationship of the mandibular teeth was secondary to the maxillary retrusion. That, however, was a minor matter. The ideal classification would be one that took into account, not only the arch relationships, but also the etiology. Unfortunately very little was known about the etiology. The net result of Professor Brash's investigations was that their cherished beliefs were thrown overboard, and they were left like a ship without a rudder. He gathered from what Mr. Chapman had written in the second edition of Bennett's book, that he was in the same position, of being almost a complete agnostic so far as etiology was concerned. Therefore one had to depend on the arch relationship. The case was rather like that of a physician who could

diagnose only dullness in the chest without being able to say whether it was due to pleural effusion, tubercular infection, or malignant growth. A good deal of prognosis was often empirical, and likely to be overset because a certain abnormal arch relationship might possibly have several causes. It had always seemed to him that while in a good many cases the diagnosis was fairly simple, although the treatment might not be simple at all, and the prognosis very difficult, there were some cases in which it was difficult even to make a diagnosis. The vast majority of practitioners in this country were not orthodontists, but general practitioners, and perhaps one was not being unkind in saying that their knowledge of orthodontics was not very profound, and depended a good deal on what they had picked up in hospital. He had found that the greatest pitfall of all in diagnosis appeared to be in those cases of postnormal occlusion, particularly in connection with the so-called Angle's Class II, Division 2. He had seen a great many such cases which were treated straight away by the extraction of the maxillary premolar and retrusion of the maxillary incisors in order to get them into line, thus making the maxillary retrusion, which was the primary defect, still more accentuated. When one had sometimes suggested that in these cases the right way to correct the condition was to advance the maxillary incisors, one had been met with a blank look of amazement at such a strange kind of treatment. Nevertheless, if such a condition were taken as essentially a retrusion of the jaws, the difficulty of diagnosis disappeared. This, he was convinced, was a real pitfall in orthodontic diagnosis. Mr. Chapman had made the startling statement that in Class II, Division 1 cases, there was no actual maxillary protrusion—it was only relative to the postnormal relationship of the mandibular teeth. The speaker could at least agree with him in this respect, that if the mandible were advanced to its correct position, and the mandibular incisors corrected, then the apparent maxillary protrusion did, to a large extent, disappear. But he thought there still remained an actual residual maxillary protrusion in a larger number of cases than the 10 per cent to which Mr. Chapman had referred. But his statement had the merit of drawing attention to the fact that in Class II, Division 1 cases, it was necessary to treat the posterior relationship of the teeth first and then correct any maxillary protrusion that existed.

Mr. Bertram Samuel, in reply, said that for his own part he would like to see Angle's classification given up altogether; he thought it misled the student very much. For example, Class II, Division 1, suggested that the causation was associated with mouth-breathing and adenoids, and as to that they were not in agreement. He was of opinion that the anatomic basis of Bennett's classification was preferable. With regard to the little side issue as to the unilateral and bilateral subdivision, he thought that most people were developed symmetrically. It was very rare to get one side of the jaw growing much longer than the other. He had seen a number of very small children where obviously there had been a swing over, and when those cases were seen six years later the origin was absolutely disguised, so that a student, seeing that case for the first time and acquainted with Angle's classification, would set it down as a case of Class II, Division 1 subdivision. The idea such a student obtained would be an incorrect one, namely that one side of the face had developed correctly and the other had not. He thought that cases of asymmetrical growth were very rare indeed.

Mr. Pitts had spoken of the difficulty of treatment, particularly of the postnormal occlusion cases with retruded maxillary incisors. They were indeed difficult, and some people had not made up their minds whether it was the right thing to make a space by extraction and bring together the teeth in the premaxillary part or to move forward the central incisors and then treat the postnormal arch relationship.

TYPES OF SPRINGS USED WITH HIGH LABIAL ARCH*

G. Hewett Williams, D.D.S., Chicago, Ill.

AS THE careful and accurate construction of springs used with the high labial arch is of fundamental importance to success in treatment, the various types of springs are shown in the hope that they may be of some practical use. These springs are attached to the body wire (0.045) in the manner shown and are usually of 0.020, 0.022, 0.025 depending upon the requirements of treatment.

Fig. 1, *A*, Recurved spring which when attached to a small round tube on anterior bands provides for the following movements: labial, lingual, mesial, distal, rotation, and root.

B, Springs with same uses as *A*, but with more elasticity to the wire due to the increased length.

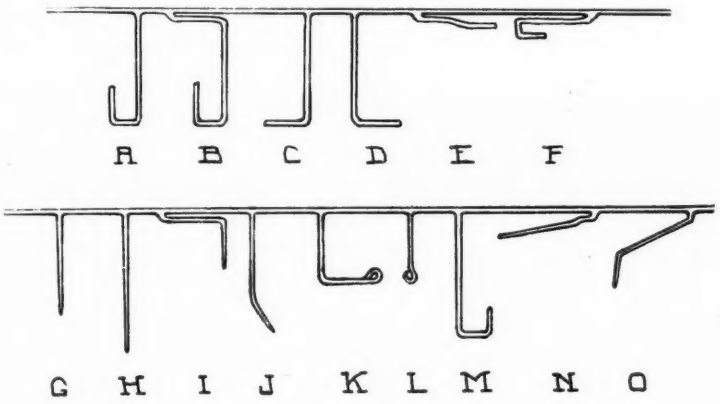

Fig. 1.

C, *D*, and *E*, For attachment into round tubes or McCoy tubes for labial, lingual, and rotation movements.

F, Same type of spring as *A* and *B*, except it is used on canines and premolars.

G, *H*, and *I*, Simple labial spring tapered to point at contact with tooth for lingual movement of anterior teeth.

J, Spring which is used between teeth slightly below contacts for mesial or distal movements.

K, Spring used with silk ligature to secure rotation.

L, Spring used with ligature to secure labial movement.

M, Spring used for depressing anterior teeth, a section of which rests on the incisal edge and slightly on the lingual.

N, Simple finger springs for lingual pressure.

O, Springs used for lingual and distal movements of canines, the free end of the spring shaped to fit mesiolabial contour of canine.

*Clinic presented at the Thirty-Second Annual Meeting of the American Society of Orthodontists, Oklahoma City, Okla., Nov. 8-10, 1933.

FRACTURE SPLINT FOR SIMPLE OR MULTIPLE FRACTURES OF THE MANDIBLE OR MAXILLA, PRACTICAL AND OF EASY CONSTRUCTION BY THE ORTHODONTIST*

HARRY E. KELSEY, D.D.S., F.A.C.D., BALTIMORE, MD.

THE orthodontist is often called upon to treat fractures, and in some localities there is no one so well equipped as he to construct a comfortable and effective splint. Having used the splint illustrated here in a great many cases of either single or multiple fractures of both the maxillae, I do not hesitate to recommend it to any orthodontist who is called upon to construct a fracture splint.

Basically, it is the old type labial arch, formerly called the "E" arch but as a rule of heavier construction. Molar bands with buccal tubes are

Fig. 1.

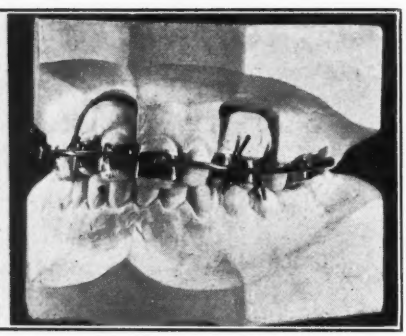

Fig. 2.

placed upon teeth distal to the fracture. As a rule, a 15-gauge round or square arch is strong enough and should be adapted to a reconstructed model made by taking an impression, pouring it, sawing it apart with a thin saw at point of fracture or fractures and placing it or them together according to the occlusion of the opposite arch. Bands to which have been soldered 18 carat ribbon wire crutches are then cemented upon other convenient teeth. If it is a simple fracture two anchorages on either side of the fracture are advisable, though one will do if no more are available. In multiple fractures bands are placed upon teeth in each section. The crutches referred to can be most easily attached to the band by soldering a U-shaped piece of wire to each band, one end projecting up, the other down. All bands are then cemented in place. The arch which has been provided with hooks or loops for ligaturing to similar loops on the buccal tubes, is then put in position and the ends of the fracture or various fractured segments are brought into align-

*Presented at the Thirty-Second Annual Meeting of the American Society of Orthodontists, Oklahoma City, Okla., Nov. 8-10, 1933.

ment with it. The ends of the crutches are turned down over the arch wire and if made of a moderately ductile ribbon wire can be bent closely down to hold each segment with great security.

The ligatures are placed to prevent the arch from slipping forward out of the buccal tubes. Variations can be designed for individual cases using a lingual arch or lingual and labial.

The advantage of this splint to the orthodontist is familiarity of construction and insertion in the mouth of the various units, and the advantage to the patient is the ability to open and close the mouth as he could not do if the maxillary and mandibular arches were wired together. He will also begin to chew soft food very soon after insertion of the splint which insures far better insalivation and exercise of all of the functions of the mouth; it is, therfore, hygienic and comfortable.

Fig. 1 shows the splint with sections and case with fractured portions before being set. Fig. 2 shows the same case with fracture set and teeth in alignment and with some of the crutches turned down over the arch.

ANATOMIC OVERLAYS*

GLENN F. YOUNG, D.D.S., NEW YORK, N. Y.

CONSTRUCTION technic.—The first step is to secure two accurate impressions of the mandibular arch. These are run up in artificial stone. After securing the impressions the buccal and lingual surfaces of the mandibular deciduous molars are ground off, converging toward the occlusal surfaces and a set of maxillary and mandibular impressions taken from which to make work models. The molar sections of the mandibular are packed with model alloy, both run in artificial stone and mounted on an articulator.

The two mandibular casts are then cut away, isolating the first deciduous molars on one and the second deciduous molars on the other. Dies and counter-dies are made from these.

This procedure consists of building up around the isolated teeth with moldine to the height of the contact points and imbedding a rubber ring 5/8 inch inside diameter and about 1 inch long in the moldine. This is poured in the Dee Master Model Metal B, fusing point 204 degrees. This forms the counter-die. When cool, it is dusted with powdered soapstone and placed in the rubber ring with sufficient of the ring free to pour the die of Dee Master Metal A, fusing point 140 degrees. Care should be taken not to have the metal too hot. This is gauged by fusing the metal in a ladle or spoon and allowing it to cool until it starts to crystallize, then passing through the flame until it becomes molten again.

We are now ready to swage the occlusal surfaces for which Ney Oro No. 2 band material is used—1/2 inch wide and 0.005 inch in thickness. By burnishing a piece of sufficient size into the counter-die, and then pressing the die and counter-die together in a small vise, we have a matrix which is a very close reproduction of the occlusal surface of the tooth to be supplied with an overlay.

Now the casts, the mandibular with the deciduous molars in amalgam, are placed on the articulator and the bite is opened the desired amount, after which inlay wax is built up on the deciduous molars of the mandibular cast, and while still soft the gold occlusal surfaces are forced into the wax, the maxillary cast forcing them into the proper occlusion. It is quite satisfactory to build these up one at a time or even to cast the second molar overlays and finish them down before shaping the first molars. With the occlusal matrix in the wax, the base is carved to the gingival margin on the buccal and lingual surfaces and parallel with the mesial and distal margins, using the gold matrix as a guide. When properly trimmed, the whole is invested and cast with Ney Oro B2, which is a very good match in color for the Ney Oro No. 2

*Clinic presented at the Thirty-Second Annual Meeting of the American Society of Orthodontists, Oklahoma City, Okla., Nov. 8-10, 1933.

band material of which the matrix is made. Care should be taken that the mold is sufficiently hot to insure a union of the matrix and the casting gold.

When these castings are polished, the proper mesiodistal contacts assured, and any necessary tubes, cleats, hooks or other accessories soldered on, they are ready for cementation.

To one who has carved overlays, this method should appeal, since it insures a reproduction of the occlusal surfaces and eliminates the tedious procedure of carving these surfaces.

CONTROLLED ROOT MOVEMENT WITH TWENTY-ONE THOUSANDTHS ROUND WIRE AND BRACKET BANDS*

B. Edwin Erikson, A.B., D.D.S., Chevy Chase, Md.

THE essential principle involved in this clinic is borrowed from Dr. Lourie's technic of the high labial arch working against a lingual arch as a fulcrum, and also from Dr. McCoy's technic of the open-tube appliance.

It is my practice in bracket band technic to employ the flat arch only for a short part of the final stage of the treatment, the aim being first to accomplish all major tooth movements with a 0.021 inch round wire. With bracket bands carrying this size of round wire, reinforced with the Mershon

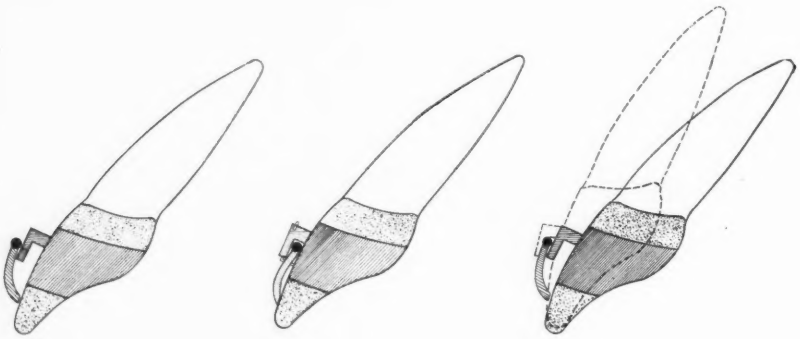

Fig. 1. Fig. 2. Fig. 3.

Fig. 1.—Showing relations of arch wire, spur and bracket before seating arch wire in bracket.

Fig. 2.—Arch wire locked in bracket.

Fig. 3.—Showing manner of root movement brought about by spur.

lingual arch, it is obviously possible to carry out all arch expansion, rotations, and even, in some cases, the correction of the overbite. For labial root movement, however, the flat arch was found necessary, until the adoption of the principle here to be described. Since the employment of this principle, labial root movement also has been added to the quota of treatment carried out with the round wire, leaving now only a small part of treatment to be carried out with the flat wire, and even this part in only certain cases.

The principle consists of soldering to the 0.021 inch round labial arch wire, at right angles, in close mesial proximity to the bracket of the tooth to be moved, an incisally projecting spur of 0.021 inch round wire, the extremity of which rests a millimeter or so above the incisal edge of the tooth. The

*Presented at the Thirty-Second Annual Meeting of the American Society of Orthodontists, Oklahoma City, Okla., Nov. 8-10, 1933.

spur is curved slightly, with the convexity presenting to the labial aspect, in order to obviate interference from the bracket band.

In operation the spur is given a lingual inclination of such degree that with the spur extremity touching the labial surface of the tooth, and with the arch wire seated in all the brackets excepting those of the teeth which are to receive labial root movement, the arch wire stands away from the position

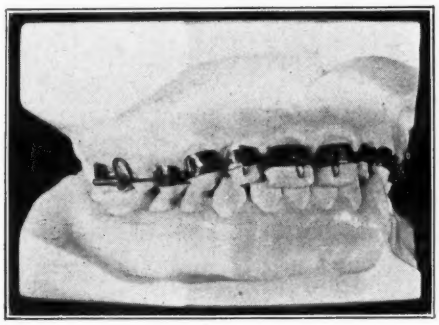

Fig. 4.—Spurs in use on practical case.

of seating in those brackets by a distance approximately equal to the thickness of the bracket. The principle is illustrated diagramatically in Figs. 1, 2 and 3, and is shown in practical use in Fig. 4. Fig. 4 shows spurs in use on only the four incisor teeth, but they may be used with equal facility on also the canines and the premolars.

Labial root movement may be carried out in this way with the mild stimulation afforded by a 0.021 inch wire, and also with the rate of movement under accurate control.

AN EXTRA FEATURE WHEN DECIDING TREATMENT*

O. N. Catchpole, L.D.S., England

CONTRARY to the usual custom of reporting results obtained by one method or another, I being young in the practice of orthodontics have few such results to draw upon, so I present to you a case that I am just commencing.

This is of a boy aged nine years, three months. He is an Angle's Class I, with two narrow arches. Of the deciduous teeth the C, D and E are present, maxillary and mandibular both sides, and the mouth generally is in a very healthy condition. Of the permanent teeth the two maxillary central incisors are erupted, the left slightly bulging forward, and three of the mandibular incisors. The interesting feature from our point of view, and from the point of view of treatment, is the fact that the mandibular right lateral incisor is missing. This was extracted some twelve months ago, as it was instanding and there appeared not to be sufficient room for it to come into line. X-ray pictures have been taken and all the other permanent teeth appear to be present. Since the extraction of the right mandibular lateral incisor the left one has erupted, and, as it is to be expected, the two central incisors have moved to the right. (Epidiascope models were shown.) The mandibular left lateral has erupted inside the arch and even if and when the two central incisors have moved as far as they can to the right, there will still be barely room for this instanding mandibular left lateral to come into line. I have said that this is an Angle's Class I. On the right side you will notice that the molar relationship is correct, but on the left side there is a tendency to postnormality. Curiously enough the center line of the maxilla has also moved to the right. I can see no reason for this except that possibly the left lateral is a little further down than the right. At the moment there is very little room for the maxillary right lateral and hardly enough for the left. The child was brought to me because of the slight prominence of the maxillary left central and the instanding mandibular lateral.

I think that it will be agreed that as the mandibular arch has lost one of its units, to obtain proper relationship between the two arches the size of the maxillary arch must be decreased by a slightly larger amount, and to obtain this there is the option of extracting either the maxillary right lateral or the maxillary right first premolar. The simpler course, I think, would be to extract the lateral. Thus, at the expense of the symmetry of the front of the mouth, the whole of the masticating surface would be maintained and also the necessary reduction in size, but as apparatus will have to be worn to expand the mandibular arch, I am of opinion that the better way is to extract the maxillary first premolar and put in apparatus in the maxillary arch to steer the right lateral

*Transactions of British Society for the Study of Orthodontics.

and canine into place if necessary. As a basis for your remarks, gentlemen, I will outline the treatment upon which I have decided.

Into the mandibular arch I am fitting a lingual bow to expand the arch sufficiently to take the instanding lateral. In the maxillary arch I shall first extract the two deciduous canines to give room for the lateral incisors to erupt and then carefully watch the case. I am hoping that the maxilla will expand with the mandible, but if it does not I shall expand it with a palatal bow. Of course, particular attention will have to be paid to the spaces to see that they are not lost. As soon as the first maxillary right premolar appears, I shall extract it and steer the lateral and canine into place if necessary.

DISCUSSION

Mr. Bertram Samuel remarked that without handling the models or seeing the patient it was difficult to give any opinion other than that advanced by Mr. Catchpole. Speaking of the treatment, he considered that it was usually a mistake to extract deciduous canines, because although an improvement was very often secured at the time in the lateral incisor region, the extraction merely postponed the trouble for a year or two, for the permanent canines were then unable to erupt into place. It had struck him that the deciduous teeth, especially the deciduous molars of the maxilla, were particularly large in this case, and gave the lecturer quite a lot of space for the eruption of the permanent successors.

Mr. Chapman agreed in general with the treatment Mr. Catchpole had outlined, but thought that he himself would not remove the mandibular deciduous canine on the left side; it would be better to keep it in order that the erupting lateral might tend to force the other teeth over to the side from which the tooth had been removed. In considering the removal of the lateral or premolar, the points which he usually took into consideration—because he was not at all averse to removing a lateral if it were advantageous from all points of view—were: (1) if the lateral were very much rotated or carious, he would consider very seriously the removal of that tooth; (2) another point to consider was the position of the permanent canine which was not infrequently very much forward; instead of being over the deciduous canine it was over the permanent lateral. Such cases were very ugly and difficult, therefore he felt inclined to remove the lateral rather than the first premolar, in order to facilitate obtaining a satisfactory result in a comparatively short time.

Mr. Catchpole, replying, said that he was pleased that he had brought the case at its beginning rather than at its end, so that he could take advantage of the advice that he had received. He had certainly decided to take out the two deciduous canines; he had not done so yet. In considering the means of getting the two central incisors back again he had thought that he would have to keep them to one side; he was only extracting one of the permanent teeth, on the side from which the mandibular lateral was missing. He would have to bring the two central incisors over a little, and therefore had no desire to fetch them back to the midline again.

DEPARTMENT OF
DENTISTRY FOR CHILDREN

THE BUSINESS ASPECT OF THE CONDUCT OF A DENTAL PRACTICE FOR CHILDREN*

MARY W. LYTLE, D.D.S., M.S.D., BIRMINGHAM, ALA.

THE problems of production, disposal and displacement of services confront the profession the same as they do industries. In other words, the practice of dentistry is a business the same as any other industry. It is therefore our duty to see that the profession assumes the high rank to which it is so justly entitled, but our ambitions cannot be realized until we assume the position of educator as well as practitioner.

Particularly is education needed in the field of children's dentistry, in order to place it where it deserves in the science of medicine and dentistry. It is in this field that more preventive work can be done than in any other.

The children's dentist should be not merely a mechanic but a wisely advising family friend. All his work points to a future set of permanent teeth, which should be kept perfect and permanent for a lifetime. This idea should be firmly impressed on the child as well as on the parents. The general practitioner should help in educating the parents, whether he does children's work or not. He should explain the necessity for children's dentistry. It is well for him to remember that the deciduous teeth are liable to all the diseases of the permanent ones, and that their systemic effect may be just as variable and equally as profound. It should be impressed upon the parents that the main motive in this work is to prevent decay of teeth as much as is humanly possible, and to get them to cooperate by bringing the child regularly so that regular examinations can be made at intervals of about three months in order that the child may be properly cared for and the occlusion studied. If this plan is followed, it is probable that the teeth of the average child could be kept clean and in good repair. The deciduous teeth could be removed from the arches at the proper time, or if lost prematurely, proper methods could be used to retain the space, and as a result the patient would enjoy better general health and there would be fewer cases of orthodontia. The dentist would enjoy the satisfaction of feeling that he was doing something worth while for humanity.

If he does not want to work for children, it is better to refer them to some one who enjoys the work. Dr. Evangeline Jordon in her book on *Operative*

*Read before the Birmingham District Dental Society, Birmingham, Ala., November 17, 1933.

Dentistry for Children makes the statement that: "At heart every true man loves children, and after he has once rendered a valuable service to a suffering child, he will be ambitious to try again to see if he cannot be more successful with the next one." The dentist who does children's work is building a future practice which will add to his success in later years.

"As the wise man looks ahead and prepares for the future, so must we consider what makes for success and then strive to achieve that success." Just what constitutes a dentist's success varies with the individual. Individual satisfaction and happiness in the work may spell success to one and not to another. No practice can be considered a success on production results alone. There should be opportunity for both professional reward and financial gain.

Upon what are we going to base professional success? Success means prosperous termination of any enterprise; or prosperity. Professional success would mean a financial gain plus a public service of the highest order. There must be a personal satisfaction found in the work, or we cannot do ourselves and the patient justice.

It is perhaps unfortunate that professional knowledge and skill will not assure financial success. Something else is of paramount importance—the business administration of an office. The dentist should analyze his individual assets of knowledge, skill, personality, and social connections, to determine and assume his proper place in the dental world. On the other hand, he must adopt and maintain such plans of procedure as will assume efficient production, place him in a position where he will attract and retain his patronage.

The size of the office and the number of associates change the business aspect to some extent. In a small office much detail work will have to go undone which would add greatly to the success of the office.

A few of the essentials to be considered, other than professional skill, are cleanliness and asepsis, courtesy, kindness, self-control, cheerfulness, reason, vigor, and enthusiasm. To these we might add personality, because any one who has studied successful and unsuccessful dentists realizes the importance of a magnetic personality. It is an unquestionable fact that personality wins where skill fails.

Gentleness and kindness are valuable assets in the handling of children. Particularly is this true with mothers of delicate children. Patients of this type are, as a rule, very grateful when their interests are guarded, and they become the dentist's most enthusiastic sponsors. Mothers always appreciate a personal interest shown in the handling of their children. It is well for them to think that their case is of great importance, whether it be a simple filling or a difficult correction of malocclusion.

"Scientific management" is a term used in the business world. Its object is increased efficiency. If it is applicable to the business or industrial world, it is equally as applicable to dentistry. For surely in the handling of children should there be scientific and systematic management in order to accomplish the most good in a minimum amount of time. The children should not be kept waiting in the reception room, neither should the time in the chair be any longer than is absolutely necessary to give the best of service.

When possible it is a good idea to do certain types of work at a particular time of day, when the psychophysical condition of both the operator and the patient are found to be most favorable. This, however, cannot be carried out with school children.

It seems hardly necessary to state that an efficient assistant is of great importance in any practice. Particularly is this true in a practice for children. In many instances the assistant can win the child's confidence quicker than the dentist can. She should have a natural instinct which draws the child to her. If she does all that rightly comes within her field, she is a very busy person. She must be fundamentally a good housekeeper, make all appointments, dispose of the petty detail work of the office, do the bookkeeping, write all letters, sterilize instruments, buy supplies, assist at the chair, and it is also very helpful if she is able to work into simple, routine laboratory service. One of the most important of her duties is the keeping of accurate records.

Clear, comprehensive records of all diagnostic data and operative procedure enable a dentist to perform his duty better in the treatment of his patients. He has a better understanding of himself in both office work and management. Records are of untold value to any dentist. Particularly is this true in children's work. The many changes which occur during growth and development if carefully recorded are a source of valuable information. Records also have a way of settling arguments pleasantly. Some one has said, "Records have a higher function than merely recording. They are an integral part of results."

Much of the correspondence can be taken care of by the assistant, but letters should be signed by the dentist personally. There are courtesy letters to be sent patients or practitioners who refer patients to them. Periodical examination reminders must be sent. Parents appreciate the implied interest in their children's welfare which is expressed by a periodical reminder card or letter. Parents of children who do not keep their appointments may be notified and their cooperation solicited by a nice little note. The collection of debts is quite a delicate problem, so we must not overlook letters for collection.

There is no subject approached so cautiously as that of fees. Nevertheless, it is hardly possible to close an article of this type without having something to say on that subject.

Dentists who make honest claims and deliver honest service may, with a clear conscience, take whatever the public is willing to pay for it. Besides time and materials they should be paid for skill based upon experience.

Some operators, in exclusive pediodontia practices, employ the yearly contract arrangement. Others work on an hourly basis. Still others use the fee-per-operation plan. The same principles should be applied to the classification of fees for children as for adults. The age of the patient should have absolutely no bearing upon the fee. Services rendered children require the same amount of education, skill, caution and operative technic as those rendered adults, and infinitely more nervous energy and care. Fees should never be quoted to children regardless of the fact that the parents might inform the operator that they wish to have such services rendered as seem necessary.

The parents should be informed of the diagnosis, the nature of the restorative work required, and the benefits to the child. An approximate fee should be

given and the importance of their cooperating in the care of the child's mouth should be mentioned.

It is not always possible to make an accurate estimate, especially on complicated cases. Therefore, it is better to suggest a minimum and a maximum fee. The proper time to discuss the method of payment is at the time the fee is quoted. The subject can be approached easily and naturally without embarrassment to either the dentist or the patient at that time.

In closing, I should like to urge every dentist to become more child conscious, and to aid in promoting children's dentistry to make it a better profession and a better business.

DISCUSSION

Dr. L. Z. McClung, Birmingham, Ala.—An index to a nation's greatness is her consideration of her helpless subjects. The helplessness of early childhood never fails in its appeal to humanity, and a more healthful sign of progress in this society cannot be conceived than the devoting of a full month to the consideration of the dental needs of children. The children of today will shoulder the responsibilities of the social order of tomorrow; and the health lessons learned and observed now will largely determine their fitness to meet the challenge.

Nothing can be said in contradiction to Dr. Lytle's timely statements. On the other hand, to be guided by them means a more wholesome dental welfare for the children under our care, and a bigger profession for us to labor in. A few random thoughts may be suggested which will place, if possible, more emphasis upon what the essayist has said.

It is my opinion that one of the burdens of the subject under consideration is to find a way to get children to the office early—quite early—in life. If we are interested in practice building, and that is our job, the children should be brought in for a social call before any defects need repairing. A few moments spent in a challenge to see who can pick up a globule of mercury first will repay a hundred fold in breaking down that wall which naturally separates the child from the doctor. Ninety per cent of them have had to face an array of white gowns during a tonsillectomy operation, and are therefore "gun-shy" at the mention of any kind of doctor.

Helen was given two "prophylaxes" with cotton rolls, and at a third sitting the cleaning was completed with a brush. She, however, refused to have an occusal fissure cavity filled in a mandibular molar. Her young brother Billie was of a different temperament. He was delighted to get some silver in his mandibular molar. Upon observing that Billie had more than she to carry back and show at home, Helen quietly climbed into the chair vacated by Billie and calmly submitted to the procedure. A child likes the assurance that his new experience is not unlike that of others of his acquaintance.

The essayist rightly emphasized the need of more education in the field of pediodontics. There is likewise a crying need that the people be educated to the need of children's dentistry. When people are told that dentistry for a growing child is more necessary than for the adult, there is little danger that the statement will be controverted; and show me the parents who would not supply the child's need in advance of their own.

The child then must come in for full consideration or else be referred, to quote the essayist, "to some one who enjoys the work." If we are going to serve them let us give them full consideration. Keep records on their cases, make inlays for them, do prophylaxes for them in such a manner that they will grow up to be dental conscious all of their days.

THE ORTHODONTIC ASPECT OF THE CONDUCT OF A DENTAL PRACTICE FOR CHILDREN*

E. W. Patton, D.D.S., Birmingham, Ala.

FOR fourteen years I practiced general dentistry; then I took the regular course offered by one of the schools of orthodontia. I had also had some orthodontic instruction during my junior and senior years in dental college. The latter consisted largely in the technic of appliance construction with little or no instruction as to what the design was supposed to accomplish. This is not at variance with the experience of most, or all, of you. Because I have considered orthodontia during my professional career, from two widely separated viewpoints, a brief discussion of the two pictures may be of profit. The purpose of this article is to bring the general dentist and the orthodontist into closer relationship, and to point out some of the duties, obligations and failures of each.

As a general practitioner, I regarded orthodontia as a part of regular, everyday dentistry; and even the scientific principles involved were nothing more or less than pure mechanics. I daily employed a mechanical separator to push teeth apart; by the same token I reasoned that a jack-screw—the stronger the better—would move a tooth or teeth to the desired position in the arch, the only limit to the force employed being the patient's endurance. To show that my thoughts and acts ran parallel, I "jacked" a maxillary canine from deep lingual interlock (linguoversion) into its normal labial position in fourteen days for a patient forty-five years old. The patient lost eighteen pounds, and consumed all the aspirin which Bayer could manufacture during that period, working day and night shifts. I seemed not to realize, at least not fully, that tissues both hard and soft, blood vessels and nerves and even the vitality of all the parts should come in for consideration. Today I am confident that the force which was employed fractured the labial bone plate in the wake of the moving tooth, thereby making travel easy and rapid. An act of malpractice in order that apparent good might be accomplished? The would-be orthodontist seemed imbued with the idea that in orthodontics, as in any other science where mechanics is involved, two pounds of pressure would accomplish twice as much tooth movement as one pound in a given length of time. I did not know or observe the nature of bone growth, nor did I differentiate between the so-called physiologic and pathologic tooth movement.

Is this true story too extreme to describe aptly the orthodontic conception of other general practitioners whose alma mater turned them out half taught? My twofold experience in orthodontics makes me bold to assert that there is a wider separation between the general dental practitioner and the orthodontist

*Read before the Birmingham District Dental Society, Birmingham, Ala., Nov. 10, 1933.

in the former's conception of the latter's responsibility than exists between any other two branches of dentistry or medicine. The dentist thinks of all malocclusions as being amenable to such treatment as will produce 100 per cent results provided the orthodontist is smart enough to design and construct the proper appliance. Little perhaps has he thought of an endocrine disturbance, of malnutrition or of an inactive growth period. Perchance in one month the family dentist referred two cases to the orthodontist. Both boys were about the same age, with crooked teeth. The orthodontist classified each as an Angle Class I. Eighteen months passed, and one of the boys was keeping an appointment with his dentist for a prophylaxis and examination. The latter was delighted with the orthodontic result. A few days later the other patient presented himself, and a look of disappointment showed on the dentist's face. He beheld teeth flaring out like the guy ropes of a circus tent. There had been little or no growth at the apical base, the cuspal portion only of the teeth having been carried out to the approximal normal positions. When treatment in this case is discontinued, it will most likely collapse to its original position or state. Who is to blame for the failure? Of course the orthodontist must shoulder it, but somebody charges him with poor engineering in the use of appliances, or neglect, or one or more of several shortcomings, all of which, were they eliminated from the count, would not have changed the complexion of the case. Maybe a condition which science has not yet revealed to us is the cause of failure.

Teeth are in malrelationship for cause. If they occupy malpositions, it is usually because their supporting structures are undeveloped or malformed. A decade or so ago the inquiring mind of the orthodontist stopped with crooked teeth. No need to go further, thought he. Why should the orthodontist—why should any one else—divorce the oral cavity and its environs from their interrelationship with all other tissues, structures and influences of the human mechanism? Prenatal influences, malnutrition, malassimilation, poor housing conditions, childhood diseases, and others of such kind should be catalogued as potential influences in the cause of malocclusion. It is often the sad experience of the orthodontist that these causes are not and cannot be found and removed. I feel no little concern for that growing class of patients, largely girls, who diet to keep thin. In some such cases I attribute failure to obtain a desirable growth at the apical base to the patient's refusal to eat nourishing food in sufficient amounts. The old "too much candy" theory of dental caries has lost its "place in the sun," and we are now told by the theorists to hold general systemic conditions responsible for this malady. In view of this premise it is not saying too much to assert that if a part of the human structure is wasted by dental caries on account of ill-proportioned diet, the absence of proper sunlight, air and other living conditions, other structures, such as those which support the teeth, will for the same cause fail to grow and develop to full stature.

To assist the general dentist it might be well to divide malocclusions, among other classifications, into simple and complex classes. The so-called simple cases are those with the maxilla and mandible well developed and in normal relationship to each other, but with one or more teeth in malalignment. Failure of a deciduous root to absorb may cause the succeeding tooth to be deflected to the

lingual. When the cause has been removed and sufficient room provided by the orthodontist for the malposed tooth, it is an easy matter to carry it to its normal position. Or better still, upon the removal of the cause, under the benign influences of growth, the malocclusion may be corrected without the intervention of external influences. Serious? Yes. Simple? Yes. When the tooth is once in its normal position, it need to be given more than passing concern thereafter. Complex cases include those morphologic deviations from the normal to such an extent as to involve, or to be influenced by, the musculature of the face and neck, the nasal air passages, the tongue, the acts of mastication, deglutition, etc. Instead of these cases presenting an undeveloped condition, it is possible that they will show growth in vast dimensions, and yet the relationship of the maxilla and mandible may be so inharmonious as to produce a grave malocclusion. This then is a case of perverted growth and development.

I am by no means attempting to furnish a list of classified cases, but rather to illustrate by cross-section what daily comes under the dentist's notice. It is not expected of the family dentist that he make a differential diagnosis in a given case, for that might require all and more of what the orthodontist is capable. He should, however, be able to recognize advancing symptoms of abnormalities and in a measure, at least, to differentiate between the simple and the complex. The wise orthodontist places many of the former on the observation list and awaits developments. It is entirely the privilege of the family dentist with orthodontic inclinations to treat some of the simpler cases, but he should be sure of his diagnosis, to wit: that it is simple, lest he consume precious time which should have been utilized by the more capable specialist. It is the orthodontist's duty to consult with the dentist who is attempting a case, and to give him every assistance possible.

The general dentist should be cautious in giving orthodontic advice. The parent is looking, and naturally so, to the family dentist for orthodontic guidance, and the dentist is sometimes guilty of minimizing the importance of early attention to grave conditions. Another point at which the dentist often—too often—errs is in extracting to correct a malocclusion. Perhaps on one occasion in consultation with the orthodontist the latter recommended the extraction of a first premolar as being a practical treatment. This would by no means substantiate the belief that all other cases presenting a somewhat similar appearance should be subjected to extraction. Professional men today do not labor behind closed doors but are eager to give their fellows the benefit of any knowledge they possess.

If you are to be orthodontia conscious, you must study facial balance. Is there symmetry between the maxilla and the mandible? How does the forehead compare in size with the lower part of the face? Is there a stare from the eyes? This is often the result of the lower eyelids' being drawn by the facial muscles as the mouth is open in mouth-breathing. Note any habits, muscular and otherwise, while the patient is off guard; particularly observe the tongue, and how it behaves and where it lies when not in the act of speaking. Next take into consideration the denture. Does the mesiobuccal cusp of the maxillary second deciduous molar fall in the buccal notch or groove of the mandibular second deciduous molar? Look for the same relationship between the permanent

molars. See that the maxillary canine occludes distally to the mandibular canine. There should be at least 28 mm. between the lingual surfaces of the maxillary second deciduous molars. As the child nears the age of four and five years, the anterior denture should show a spacing—the so-called "growth spaces." The frenum labium is always attached to the peak of the ridge at birth, but as the face grows downward and forward the ridge grows away from this point of attachment in the normal cases. When this does not occur, and there is a space between the central incisors after the lateral incisors have erupted, the frenum should be removed.

These are some of the observations which the dentist should constantly make. More might be named. It is enough if he has his "ear to the ground" listening for the little things, and cooperating. Thus by laboring for a common cause, will the patients' best interests be served.

DISCUSSION

Dr. R. L. Houston, Birmingham, Ala.—Certainly the average dentist does not appreciate the difficulties, problems and responsibilities of the orthodontist. Dr. Patton mentioned the very different progress of two cases. He might also have mentioned an occasional failure to cooperate on the part of both patient and parent in keeping appointments and tolerating appliances. Sometimes the dentist can assist the orthodontist considerably by coaching just a little an unappreciative and thoughtless patient or parent.

Dr. Patton had these boys report to their dentist for prophylaxis and examination. I hope that some day it will be the expected procedure for the orthodontist to have the privilege of doing this, or at least of giving the prophylaxis, because when the appliances are being adjusted and changed the teeth can easily and properly be polished and examined. It seems to me that in fairness to the patient this should be done more often than perhaps is generally the case. The economics of such an idea would have to be worked out, as the orthodontist could hardly be expected to assume such a responsibility without remuneration, but I believe the dentist should be willing to follow any caries-preventing measure that the orthodontist might suggest, as mouths vary so much in their natural cleanliness and susceptibility to decay. I believe also that the orthodontist should be among the leaders in research regarding dietary and other measures to help bone and tooth development, and dentists should be open to every suggestion from them in the field of preventive dentistry. I cannot believe that excessive candy eating can be overlooked as a very bad habit for children, and we can improve the race by stressing temperance in that regard.

Dr. Patton failed to mention heredity as a factor to be considered in facial development and whether it has any place in the consideration of these cases of prospective malocclusion.

Sleeping habits, such as keeping the hand under the face, should be watched for and broken by the parent, but I recall some controversy regarding the effect of such habits.

I appreciate very much Dr. Patton's mentioning the mesiodistal relationship of the maxillary and mandibular molars, the proper expansion of the maxillary arch to 28 mm., the frenum, etc., as guides to us in watching our child patients.

THE CHILD'S MOUTH*

HAIDEE WEEKS, D.D.S., NEW ORLEANS, LA.

POETS are born, not made''; likewise the God-given gift of tact in the handling of children comes to some and is denied to others. Tact is the touchstone which admits one to the sacred precincts of the child's heart, and gives one his confidence and obedience. Failing tact, we can do much by careful study of the child mind to bridge the chasm which lies between ourselves and those chosen ones, but the innermost court of the temple will never be reached.

Some years ago when I began to write on dentistry for children I looked in vain for a textbook on the subject. I could count on my fingers the dentists in this country who, outside of orthodontia, were specializing in dental work for children. When we think of the enormous field, we would marvel if we did not know the reason.

One finds oneself at the beginning of writing anything on children's dentistry about to plunge into the field of psychology. Success in this work surely must travel over this route if it comes at all. Be our operator ever so skillful and trained in every scientific department of dental education, unless he be a practical psychologist, specializing in children's work he will fail.

It may seem that the details of the method of receiving the child and the initial steps of the examination are very trivial things. However, let it be emphasized that success in operative work for children is largely a matter of morale and the application of the rather simple principles of the psychology of the child.

The child must not be awed by the appearance of complicated equipment which will bewilder him. The average child has often had the fear of the dentist instilled in him from birth. So, the calmer, firmer, more cheerful we can be, the greater the success. The child must walk in and seat himself comfortably in the chair. I always ask his name and birthday, and comment on his clothes, socks, etc., while I am putting the towel on him, and in answering these questions his mind is diverted. He is asked questions as to what caused the toothache, etc.; and if extraction is necessary, he is told that it will hurt just a little bit, and will be over in an instant. The child realizes a service done him and gives proof of his gratitude in his future behavior. The child who has never been to the dentist, and who is distrustful, is given the pleasure of a ride up and down in the chair; shown how the engine works; the spray bottles, etc. Different children require different treatment. One thing that is most necessary is ''decision.'' I let the child feel that he is helping in everything I do, and he, in turn, will feel that if he suffers, his cooperation is to immunize the pain. I never deceive

*Read before the Birmingham District Dental Society, Birmingham, Ala., November 24, 1933.

the child in the slightest degree. Usually the most perfect frankness gains his confidence at the start, and the day is won.

In examining the mouth of an infant, the operator should look at the region where, according to age, the tooth should erupt; second, he should examine for lesions of the mucous membrane; and third, for abnormal frenum.

As the older child walks into the room the operator should judge his size, hair, complexion, eyes, nose, shape of face, stature, carriage, etc., and record all abnormalities observed. When he gets into the chair, the operator will have made a fair diagnosis as to his mental and physical condition. His age, weight, previous illnesses, whether bottle or breast fed, a "repeater" in school, are next determined. The examination of the lymphatic glands is made, and lip conditions are noted. He is made to swallow, breathe, open and close the mouth, and move the jaws laterally. A crackling sound due to an abscess condition in the deciduous teeth sometimes occurs and is worth looking for. The child as asked to open his mouth, and the tonsillar condition is noted. The condition of the soft tissues and the existence of abnormal frenums, labial and lingual, are, of course, observed. Sinuses or pockets around the teeth and condition of the peridental membrane are next looked for.

The number of permanent teeth erupted is noted; the number of vital and nonvital teeth; and the number of missing teeth. Angle's classification of malocclusion, if any is present, is made. Cavities in permanent and deciduous teeth are noted.

The shape, size and condition of the deciduous and permanent teeth often enable us to aid the pediatrist in a diagnosis. The retarded absorption of the deciduous roots always requires an explanation. First, a radiograph should be made to determine the presence and location of the permanent teeth. Second, when a history of nonabsorption of any deciduous tooth is obtained, and the family history is lacking, a Wassermann reaction will, many times, furnish the explanation of the cause.

The members of the American Society for the Promotion of Dentistry for Children heartily recommend for all examinations the use of Dr. Alfred Walker's "Classification of Examinations for Detection of Dental Caries, Types I, II, and III," which was published in *Dental Cosmos*, March, 1930. Dr. Walker's classification follows:

"Type I. Good light is essential, either daylight or artificial light.

"Food and débris and all kinds of deposits shall have been removed from the exposed surfaces of the teeth.

"Tooth surfaces must be dry when subjected to examination. Compressed air should be used and dryness maintained by use of cotton, napkins or rubber dams.

"Direct magnification should be employed by the use of the Beebe binocular loupe.

"Suitably designed explorers having points not coarser than 36 gauge B. & S. standard, i.e., must definitely catch in gauge 36 Brown and Sharp standard wire gauge or its equivalent.

"X-ray examination for the detection of interproximal caries in all cases where interproximal surfaces are not plainly visible.

"Type II. Good light is essential, either daylight or artificial light.

"Food débris and all kinds of deposits shall have been removed from the exposed surfaces of the teeth.

"Tooth surfaces must be dry when subjected to examination. Dryness may be secured and maintained by compressed air, cotton or napkins.

"Magnification.

"Explorers must conform with requirements in Type I.

"Type III. Good light is esential, either daylight or artificial.

"Either or all of the following: mouth mirror (free of blemishes on the surface or backing of mirror); tongue depressor; explorers, which may or may not conform with requirements in Types I and II.

"Type I outlines the minimum requirements for complete examination for the detection of dental caries.

"Type II is an attempt to outline the minimum requirements for group in the school or the clinic where, because of lack of facilities or time, it is not possible to make the complete examination as provided for in Type I, but where the services of the dental hygienist are available.

"The Type III examination provides for the procedure where large groups are examined and where for lack of time and facilities the examination must of necessity be incomplete.

"When reports are submitted for publication, they should state whether results are based upon Type I, II, or III examination.

"This outline for mouth examination for the detection of dental caries is based upon present knowledge. Contemporary and future investigations may suggest changes."

Dentition may be defined as the physiologic process by which the child is provided with teeth. It begins with the formation of the tooth germ at about the middle of the second month of fetal life, and ends with the establishment of the permanent third molars in the arches.

While the eruption of the teeth is a physiologic process, it is nearly always associated with disturbances of function which are pathologic. The process by which the tissues are forced out of the way is one of absorption under pressure. The cusps of the teeth act as an irritant which produces the stimulus to the absorption, in consequence of which the tissues are tender and painful. A hyperemic condition can be noted at a glance besides the other phenomena accompanying inflammation. The parts become hot and a desire is manifested to bite cold things in order to relieve pressure irritation. This is nature's provision for forcing the gum tissue away. The infant may aid nature by the use of an ivory or silver ring, but preferably by the mother's massaging the gums with a small brush and iced water.

Faulty nutrition, undue density of the overlying tissues or other complicating circumstances may interfere with the process of dentition, and we may occasionally encounter complications which even endanger the life of the infant.

In examinations of children's mouths we frequently see small vesicles about 2 mm. in diameter surrounded by a reddened zone. These soon rupture, forming ulcers with grayish bases and bright red margins. The ulcers are sunk into the tissues, and the slightly indurated margins stand above the surrounding areas. They most frequently occur on the margins of the tongue, and the inner surfaces of the lip and cheek. These conditions are usually associated with attacks of nervous indigestion. Children often refuse to eat on account of the pain.

The ulcers should be touched with a 5 per cent solution of silver nitrate.

Thrush, or parasitic stomatitis, in very young children is seen on the mucous membrane. It is caused by the *Oidium albicans*, which belongs to the yeast family presents branching filaments and spores. It rapidly develops in unclean mouths, especially when catarrhal conditions of the mucous membranes are present and acid fermentation of food remnants is permitted to occur. This attacks the tongue first, then rapidly spreads to all mucous surfaces and appears as slightly raised, pearly white spots which gradually enlarge and coalesce.

The mouth should be kept scrupulously clean, and an alkaline wash should be used to relieve the burning sensation. The general health should be taken care of by the pediatrician, as it will be found that the child's nutrition is poor, presenting some marked disturbance in digestion.

The treatment of caries in the child's mouth should be no different from treatment of the adult's mouth. There is no condition in the tissues of the child's teeth which is any different from that occurring in the adult's teeth. The same fillings can be placed if we can prepare the cavities in the same way.

Between the third and fifth years, in my opinion, is the average age for abscess. It is during these years that we have our greatest struggle.

The child, accompanied by his toothbrush, should be brought to the dentist the second year, as the care of the deciduous teeth is of prime importance to facial contour, and the value of the permanent teeth in relation to their formation and position in the arches. By bringing the child early, no painful operations are necessary, as a rule, and the dread of the dental chair is not instilled in him. As he grows older he can be taught prophylactic measures which will materially aid him in the care of his teeth.

The rachitic child and the anemic child will not have perfect absorption. Anything which interferes with metabolism will arrest absorption. Permanent teeth are deflected in their eruption by lack of absorption of the roots of the deciduous teeth. The premolar is often held back by lack of absorption of the roots of the deciduous molar. This will not happen if the x-ray examination is used to determine, at the time of eruption, the cause of the delay.

Deciduous teeth are subject to all diseases common to the permanent set, but in a modified form. Hyperemia results from the same causes but does not produce such severe pain as in the adult.

Bacilli of tuberculosis have been found in the scrapings from carious cavities in children otherwise free from clinical evidence of tuberculosis. These findings may account for a considerable number of infections occurring in childhood or adolescence, and render imperative the treatment of caries in the child's mouth. Many other pathogenic organisms have also been found in caries.

In the last year there has been a great increase in cases of Vincent's infection in young children. There seemed to be quite a difference of opinion among the pediatricians as to the diagnosis.

Among most diagnosticians it is agreed that oral sepsis is the chief predisposing factor; yet some believe that the teeth should not be cleaned until the symptoms have been brought under control by medication. Medicaments are as diverse as their advocates, though all dentists agree as to the value of oxidizing agents.

There are three types of Vincent's infection, namely, acute, subacute and chronic.

In the small child, as far as I have seen, there is only one type of Vincent's infection found, the acute. It involves the gingivae in one or both jaws, and is characterized by highly inflamed peridental membrane, temperature, distinctly fetid breath, and, sometimes, the greyish slough seen in the adult. The patient suffers pain, prostration, and loss of appetite. In the child, more often than in the adult, the lips, the inside of the cheek, the tongue and tissues are involved. In two cases there were enlargements of the knee joints, which indicated a rachitic condition. The majority of these cases which have come under my observation occurred at the time of the eruption of the second deciduous molars, the flap over the erupting tooth making an ideal harbor for the incubation of the organism. In the treatment of these cases, there is much diversity of opinion, but most agree that the condition is caused by oral sepsis; hence the most effective treatment is ridding the mouth of infecting organisms, bringing about a speedy cure. Good hygiene should be established as soon as possible. Many of the prolonged cases of Vincent's infection are probably a result of the older conception of "drugs first, and cleanliness afterward."

The anaerobic organism can live only in an environment of lowered oxygen tension, hence the use of oxidizing agents. The mouth is sprayed with a solution of sodium perborate for several minutes. With small cotton rolls the areas are isolated, and a 5 per cent chromic acid is applied. The child is given an orange and tomato diet for two or three days. The bowel movement is accelerated with milk of magnesia. The patient is seen as often as necessary. A sodium perborate solution is used at home every hour, and the patient is told to hold it in the mouth to make bubbles.

There is always a history of bad feeding and accompanying lack of prophylaxis in these cases. In contradistinction with the recurrence in the adult mouth, there is no recurrence in the child's mouth. Perhaps the molar on its eruption provided the harbor for the incubation and, when it was erupted, effaced the pocket.

As students we were taught that if we could save the first permanent molars, we should be doing more than could be expected of any one person. Now, by deeper study and research, we are in the depths of preventive dentistry that will prevent systemic disease. Instead of being merely mechanics who keep the chewing machine in order to masticate food properly, we are studying the effects of diseased mouth conditions upon the general health of the patient.

We, who went out into the world nineteen years ago to "save the first permanent molars," thought that by seeing the child at the sixth year or exactly

at the time of the eruption of the first permanent molar, we could prevent its loss by our meticulous skill in finding and filling the defective pits and fissures. We thought, of course, that the molars always erupted in their proper positions.

What about the first permanent molar which erupts with atrophy or white spots, where, by microscopic examination, we find only enamel rods with a deficiency in the cementing substance?

What about the first permanent molar which erupts in malposition because of loss of the deciduous molar?

Can we save the first permanent molars by seeing the child at the period of the eruption of the molar, at the sixth year of the child's life?

We most assuredly cannot.

We then began our work with the preschool age, to prepare for the reception of the first permanent molars in a nice well-kept mouth. That went along very well. Then into the well-kept mouth erupted, sometimes, a poorly formed diseased permanent molar. That, again, caused our preventive work to go further back than the preschool age.

We know, from histology, that whatever disturbs the metabolism of the mother disturbs that part of the fetus undergoing growth at that time. Now we are carrying our work of preventive dentistry to the pregnant mother. The old adage "a tooth for a child" is not alone an adage of the South, for many old practitioners in all parts of the country still cling to it. We must cooperate with the medical profession, particularly the obstetricians, and have them give the patients the diet necessary to make good, healthy teeth in the mouths of the future generation.

In the examination of my patients I inquire when they had dental attention last. At every appointment, while my patients, young or old, are in the chair, preventive dentistry is preached during the examination. They hold the hand mirror and are shown where the cavities and diseased conditions are found, and why. If they are too small to hold the mirror, the mother is asked to remain by the side of the chair and to observe in the mouth mirror the defects found.

At the first visit the patient must bring his toothbrush and show how he uses it. I instruct him in my way of brushing both tissues and teeth. He is taught that there are five sides to be kept clean on every tooth. The brush must first be fitted in shape and size. It must be held with bristles parallel to the long axis of the teeth, and the soft tissues brushed with a downward motion, continuing the downward stroke to the incisal edge of the teeth on the uppers. For the lowers, use the same procedure with an upward stroke. On the occlusal surfaces, use a mesial and distal and lateral motion to clean the grooves. The soft tissues, including the tongue and cheek, need brushing as well as the tooth itself.

A week's diet of the patient is brought in, including the intake of water, and is studied. Most amazing will be the information received therefrom. You can make an oral diagnosis more intelligently when you know how he is being nourished.

When the patient's mouth is in perfect condition, you will have determined about his susceptibility and immunity to caries, and a future appointment is given him for examination and scaling.

There are few who can go more than three months with safety. There are some I see every six weeks. There are numbers whom I have seen for six, seven and eight years, for whom I have never had a cavity to fill.

After an illness of any kind the patient should report as soon as possible to the dentist for examination.

We must feel that the patient who sits in our chair is ours for life, and we must give him the best we have in advice and technic. I tell a new patient that when his mouth is put in order, I expect him to keep it so by following my directions.

The demand on us is too great for service and the number of good dentists is too small to waste our efforts on those who think so little of good service as not to cooperate and appreciate. There is more in life than the monetary consideration, and this is one of the points in my talks to my patients. I give them the best I have, and in return I expect at least gratitude shown in cooperation.

Nothing I have been able to state with a fair degree of certainty, could I have done without the records I have of my cases. The information to be derived from systematic keeping of records by workers in this field is of inestimable value. In this connection, I should like to suggest the use of the Standardized Examination Chart which the American Society for the Promotion of Dentistry for Children perfected in 1933, the filling out of which would result in the compilation, on a large scale, of data which would be of vast usefulness. Such a standard form will quickly find its way into the hands of all who are examining children's mouths in schools, in institutions and in welfare work.

I am convinced of the necessity of filling all cavities in the child's teeth whenever they are found. If this is impossible, an extraction is necessary. Very sharp instruments and a finished technic are essential. Usually no anesthesia is practical in working for the child. It is striking how much may be done with perfect instruments in deft hands.

Our measure of success in treating children is the preservation of the deciduous denture until such time as the permanent teeth are ready to erupt. Obviously, the filling and care of the deciduous teeth are only to be done by prophylaxis and removal of decay and filling. Extraction is the evidence of failure to do these things, and is a last resort for the reasons cited above. Let us remember then in all our work for the child that:

> Nothing great is lightly won,
> Nothing won is lost.
> Every good deed nobly done
> Will repay the cost.

DISCUSSION

Dr. Clay Hassell, Tuscaloosa, Ala.—In the practice of dentistry, whether for adults or children, psychology is a necessary and important adjunct to our armamentarium if we are to achieve a modicum of success, albeit many times used unwittingly by the operator. However, its use with children is highly important and requires a special capability on the part of the dentist or the assistant, and let me state with emphasis that a capable assistant may be of inestimable value in this connection, especially if the dentist is deficient in the application of child psychology—and most men are.

Dr. Weeks expressed some surprise at the small number specializing in children's dentistry. This should not seem surprising when viewed from the practical utilitarian or

economic viewpoint, as it seems highly undesirable to dismiss an otherwise delightful and desirable patient for no other reason than that he has reached a certain age, and thus terminate what has been a mutually pleasant and profitable relation, unless, of course, one is associated in a group practice in which event a certain amount of general supervision will be continued over the departing patient, for a time at least. Would it not be much better—and that is unquestionably Dr. Weeks' real object—to induce every dentist to assume his own share of responsibility to the community, to the individual child and to the honor and dignity of the dental profession as a branch not only of the healing art, but also as a branch of preventive medicine? In the last two decades a philosophy that would belittle the seriousness of purpose on the part of individuals has been in the ascendency and it has been said at times, that we in the South take ourselves too seriously, but we have in Dr. Weeks one from the far South who is earnest in her effort to remove the stigma of indifference, if not wilful neglect, on the part of the average dentist in caring for children.

The detail of the examination as outlined is highly important and worth special attention, and its application in practice for adults as well as for children is desirable. If this detail were carried out in every case, including x-ray examination, it would not take more than another generation to erase the idea from the minds of Mr. and Mrs. Average Citizen that dentistry is only a skilled trade, and that an examination is only a bid for or on the services which the individual wishes to procure, and that it does not entitle the dentist to any compensation for the examination.

We realize that the minutia of nature is frequently imperfect, realizing and at the same time making due allowance for the great difficulty with which the modern family is confronted in selecting the daily food supply to nourish the entire body tissue properly, and at the same time to encourage rather than hinder its normal functioning, it is not surprising that Dr. Weeks refers to the pathologic condition of a perfectly normal physiologic process —the eruption of teeth. However, it is my opinion, based on observation since the beginning of the Spanish-American War, that frequently eruptions do occur, and in fact would always occur, without pathologic conditions if the syndrome of nutrition, assimilation and elimination were in perfect balance. In other words, greater emphasis should be placed on the food and drink intake, as a means to fewer pathologic conditions.

It is well that we give serious heed to the observation that decayed teeth are a common portal of entry into the body for the bacilli of tuberculosis, and especially is this probability increased in case the pulp becomes involved.

So-called Vincent's infection is present in practically every mouth coincident with adolescence and probably is actually present in the mouths of most infants—especially after the eruption of the first tooth. I am firmly convinced that this infection becomes pathologic only when it grows on a favorable soil; that mucous tissue in a state of nutritional balance will never be disturbed by the nonvirulent fusospirillum which may develop thereon, and that this infection only becomes virulent when propagated on the favorable soil induced by imbalanced nutrition. However, the pathologic condition is a stern reality and must be combated by every available means, not forgetting immediate and complete mouth sanitation and corrected food and drink intake as well as the proper elimination of body wastes.

I urge the use of trichloracetic acid in the treatment of the ulcers of aphthous stomatitis instead of silver solutions. The pain is relieved at once. The results are more pleasing, and it is much less disagreeable to handle—25 per cent to 50 per cent solution is desirable, applied on as dry a field as possible.

The toothbrush instruction is exceptionally good, and we shall do a real service to the little patients if we not only teach them how, but also teach them why the teeth and mouth must be kept clean. We first stress the filth that is swallowed with food that was clean until it reached the unclean mouth, which is the gateway to the body, which is the castle of the soul. Then we urge that they at all times keep this gateway and its guards, the teeth, immaculate, so that they shall be spotless and fit to do honor to the dwellers and guests in the castle. Then follow with the "How" in which we like to speak of the "downward motion" as a sweeping, rotating motion—stressing that the brush is to be used not as a scrub brush but rather as a broom—not much pressure being exerted; and the rotation is emphasized as a means of bringing the bristle ends into contact with the teeth, since side-swiping will not

clean them. In other respects we follow the general method outlined by Dr. Weeks, except that we like to systematize the procedure by what we have heretofore designated as the ''section technic,'' which requires beginning on the buccal surface of the last distal tooth on the right of the maxillary arch and follow successively around to the last one on the left, and in a like manner on the palatal and likewise on the mandibular arch, and in addition, as early as is feasible, we like to instruct them in the pivoting or Charters technic which is commonly referred to as ''shimmying'' the bristles of the brush between the teeth.

The diet list including all liquids is important as a lead to helpful advice and will prove an invaluable aid to better understanding the relation of food and drink to the problems involved. The studies of Weston A. Price as well as those of Milton T. Hanke are of great value in this connection.

TECHNIC OF FLASKLESS CASTING

J. V. Turner, D.D.S., Wilson, N. C.

FLASKLESS casting is a new method of casting inlays, so revolutionary in character that a change in every phase of the usual casting procedure is necessary. In this technic the flask or ring is entirely removed. The mold being thus freed from internal stresses, full compensation for all casting shrinkage is provided by the thermal expansion of the investment alone. The use of much equipment is dispensed with. The laboratory time of investing and casting is materially reduced by this technic, as can be easily comprehended by any one.

The history and purpose of this technic have been presented in my paper "Flaskless Casting,"[1] in which a brief outline of the procedure was given. It is my purpose now to describe this method in greater detail, so that the features may be comprehended more fully.

This new method has for its object the formation of a dense, hard core of investment material that immediately surrounds the wax pattern and is, in turn, surrounded and supported by an outer investment of such strength as to allow the complete removal of the ring or flask. The expansion of this outer investment is such that it imposes no restriction on the core, which is freed from all internal stresses and attendant distortions. In the formation of the core around the wax pattern, the condensation of the investment by vibrational means produces a density of mass, a minuteness of adaptation, and an increase of expansion that cannot be obtained in any other manner. This procedure, the formation of the core, is the heart of the whole technic, and all other steps are but adjuncts to this objective of producing a bubble-free, dense, high expanding pattern cavity for the reception of the molten metal.

In the technic given, it is assumed that a properly prepared wax pattern has been obtained and is securely attached to a sprue ready for investing.

To Make the Core.—In a clean plaster bowl, place four or five drops of water; add sufficient investment to make a mixture just too stiff for pouring; spatulate and spread thin upon the side of the bowl a few times to avoid air bubbles, and transfer to the wax pattern. Care must be exercised to vibrate the investment into sharp corners or recesses without trapping air. Use just enough investment to cover the pattern, and vibrate to distribute evenly the mass around it. Quickly rotate the core in dry investment and immediately withdraw. The adherent investment must then be condensed into the core by drawing a knurled instrument across the sprue (Fig. 1) until moisture flashes upon the surface. The core is rotated in the investment again and vibrated, this procedure being repeated until moisture cannot be brought to the surface. The core is then laid aside until the outer investment is made.

Because of the vibration employed, the sprue must be firmly attached to the wax pattern. This objective is best obtained by priming the end of sprue with sticky wax before attaching it to the pattern.

To Make the Outer Investment.—Mix equal parts (by volume) of investment and silica compound together in a plaster bowl; add water sparingly to make a stiff mixture, almost to the point of crumbling, never thinner than putty. Using the fingers, place in a well-oiled sectional ring seated on an

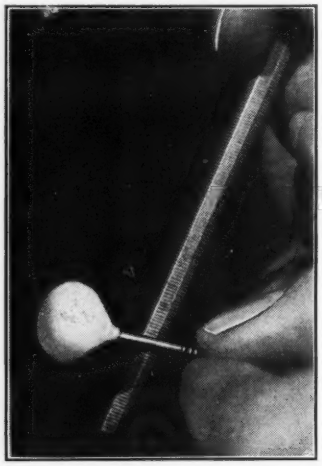

Fig. 1.

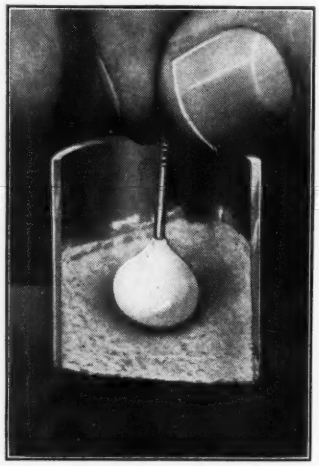

Fig. 2.

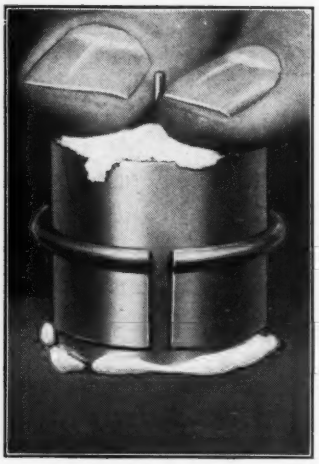

Fig. 3.

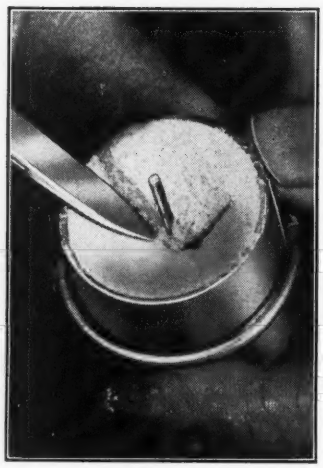

Fig. 4.

oiled glass or metal base enough of this mixture to fill the ring about one-third. Make an indentation in the center of this in which the core, by means of the sprue, is seated (Fig. 2); and add the rest of the investment until the ring is completely filled. The mass is then solidified by exerting pressure upon the surface with the thumbs (Fig. 3) until moisture appears at the base and the mixture feels more plastic. After setting takes place, the crucible is formed by trimming out to the desired depth around the sprue (Fig. 4) and applying a coating of crucible paint (Fig. 5) to fix any loose grit and prevent possible contamination. The sprue and sectional ring are then removed

(Fig. 6), and the flaskless case is heated for casting. The cross-section (Fig. 7) shows the position of the core, crucible, etc., in a case properly invested. The flaskless case is subjected to low heat until all moisture is driven off, after which it is carried to the desired high temperature for casting.

Any degree of expansion desired may be obtained by heat control. In inlay work there are three distinct types that require variation in expansion. The first type is the simple inlay which involves only one tooth surface, and which must be slightly less than dimensional to seat properly. The second

Fig. 5.

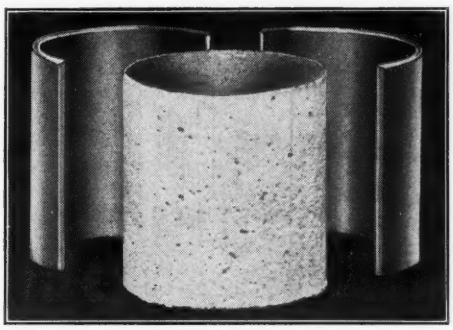

Fig. 6.

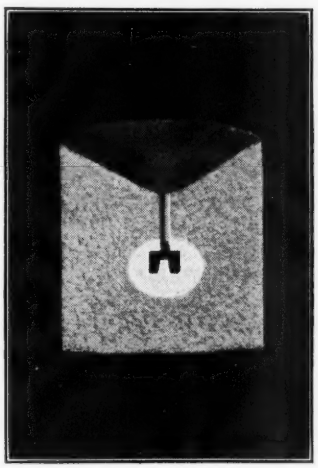

Fig. 7.

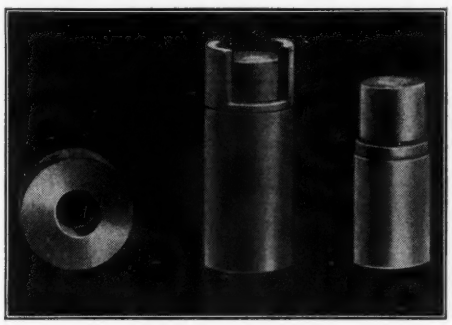

Fig. 8.

type includes inlays involving more than one surface, and for these, dimensional expansion is indicated. The third type embraces all overlay preparations—such as full or three-quarter crowns and orthodontic bands. Castings of this type obviously require slight overexpansion. These types are represented by the three steel dies shown in Fig. 8. Electric ovens indicating exact temperatures, while desirable, are not essential, for the degree of redness down the sprue indicates the degree of the expansion of the mold. Simple inlays should be cast when the sprue reveals a dull redness; compound inlays

should be cast when the sprue is cherry red; and overlay preparations should be cast at bright, glowing redness down the sprue. A gas flame, electric oven, or any means may be used for heating the case, the only condition being that the sprue shall have the desired redness before casting.

From the foregoing it is evident that this technic required the development of new equipment and materials. The removal of the casting ring necessitated the development of an investment material of proper expansion that would stand up under high heat when unsupported. The silica compound was formulated to increase the expansion and strength of the outer investment. The casting machine was designed to support the flaskless case without imposing any external stress upon it during casting. An ensemble of the required equipment is shown in Fig. 9, and a consideration of this equipment is essential to a full understanding of the scope of this technic.

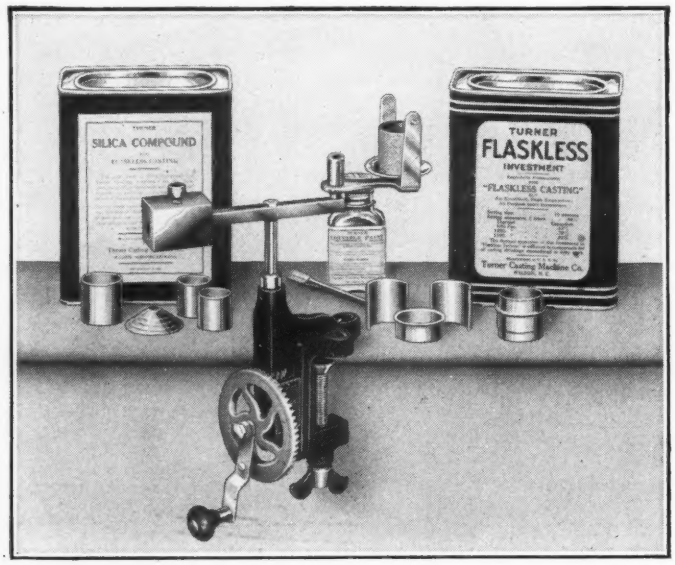

Fig. 9.

The split ring with collar, provides a convenient means for molding the flaskless case. The spring or resiliency of the collar allows setting expansion to take place without restriction, and when the case has set, the two halves readily peel off.

The crucible paint provides a nonoxidizable coating for the crucible that fixes loose grit and prevents contamination. It should be noted that the operator trims out the crucible, which is done in less time than that required to mount the pattern on a crucible former. In this manner, too, the operator may vary the crucible in size and depth to suit the needs of each particular case.

The investment material especially developed for this technic is a high expansion product that is resistant to high temperatures. It is used pure in making the core, but it is combined in equal parts with the silica compound for the outer investment. In addition to the increased strength and expan-

sion that the silica compound imparts to the outer investment, the use of this material conserves the use of the more expensive investment material, and imparts a porosity to the mass that shortens the time required for heating the case.

Flaskless casting is a high heat technic. When the case is removed from the oven or flame, the casting should be made with the least possible lapse of time, because delay at this point means loss of expansion. The contact surface between the heated case and the casting machine should be reduced to a minimum to avoid as much as possible the rapid extraction of temperature from this source. It is evident, furthermore, that with the ring removed, there must be special provision for supporting the flaskless case during casting. To meet these conditions, a centrifugal casting machine (Fig. 10) was designed.

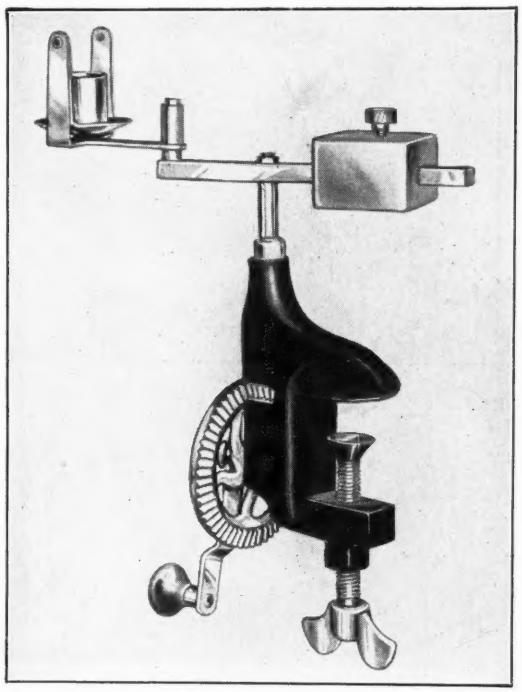

Fig. 10.

This device provides two axes of rotation which allow the flask to rest in a vertical plane when stationary, but under the impulse of centrifugal action the flask swings outward, and assumes a horizontal plane. The free amplitude of movement prevents any spilling tendency when the device is rotated from the peripheral position, and this provision allows the heated case to be placed, without fastening, on the machine exactly as it would be placed on a bench or any flat surface. Fig. 11 shows the operator seating a flaskless case on the machine. The concave design of the flask support or pan is such that it makes contact with the heated case at the outer edge or rim only. (This contact is indicated by the arrows in Fig. 12.) In this manner there is a minimum extraction of heat from the mold by the conductivity of the necessary metal support. Because of the vertical position of the flask, when stationary, the

separate crucible is dispensed with, and the metal is melted in close proximity to the mold. Thus the path of travel is reduced, the danger of congealing lessened, and a violent initial entry of the metal into the mold avoided, as cannot be done when the metal is fused in a separate crucible and thrown into the converging walls of the sprue.

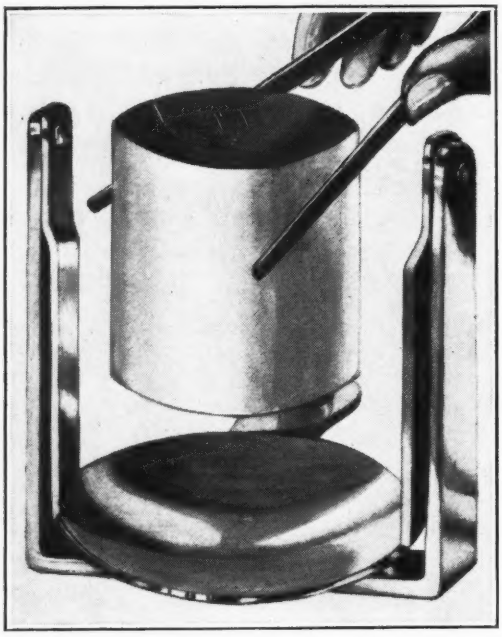

Fig. 11.

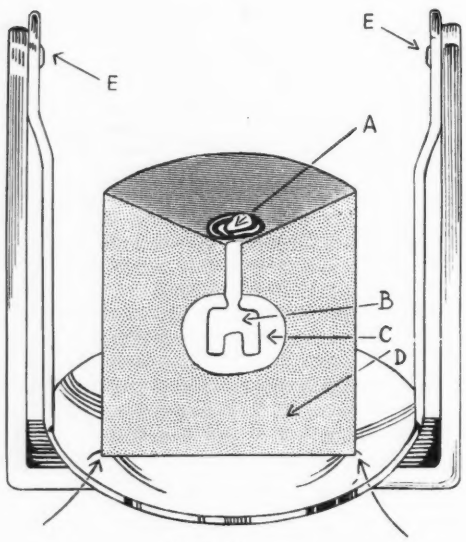

Fig. 12.

Fig. 12 is a drawing of the flask support with a cross-section of a flaskless case seated in the pan. In this drawing, *A* represents the molten metal; *B*, the pattern cavity; *C*, the core; and *D*, the outer investment. *E, E* indicate the bearings that allow the flask to swing outward under the influence of centrifugal action.

While designed for flaskless cases, it is evident that this machine will accommodate flasked cases equally as well. Casting rings up to 1¾ in. may be used, covering the range of work usually done by the dentist, and for the rings of differing size no adjustment of the machine is required.

To summarize, it may be said that flaskless casting provides sufficient expansion to compensate for all shrinkage encountered.

The required expansion is obtained from the thermal expansion of the investment alone.

Any degree of expansion desired is obtained by the simple means of heat control.

The immediate formation of the core around the wax pattern reduces the possibility of wax distortion to a minimum.

The removal of the flask allows more rapid heating and facilitates the removal of the investment after the cast is made.

The use of mechanical spatulators, weighing devices, water-bath equipment, crucible formers, casting rings, wax eliminators, and special ovens is dispensed with.

There is a considerable saving of time.

The technic is easily comprehended and is not beyond the ability of any operator.

REFERENCE

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PEDIATRIC PSYCHOLOGY AND THE CHILD GUIDANCE MOVEMENT*†‡

JOSEPH BRENNEMANN, M.D., CHICAGO, ILL.

(Continued from page 204, February)

By this time the mother is a little bewildered and she wonders how other mothers are meeting their problems. She joins a child study club, in which she hears much about other children and probably always comes away with at least one conviction, that the only perfect child is always in some one else's family. If there was some bridge and some tea with it, then, at least, it was a social success. To get real help for her problems she must look higher to something more authoritative. She joins a Society for Child Study and Parent Education. What could be more aggressively comprehensive than that? That ought to fill the bill. She goes to a meeting and listens dutifully to a program such as the following, that I will give in full as actually taken from the program: How Can Ethical Attitudes Be Developed? Child Training for International Intelligence, Training for Racial Bigotry, The Effect of Motion Pictures on the Social Attitudes of Children, Developing Vocational Attitudes, Parental Influence in Creating Religious Attitudes in Children, Training for Citizenship, Attitudes on International Relations, The Conflict Between Scholarizing and Socializing the Student. It would be interesting to read the thoughts of an intelligent, common-sense mother on her way home from such a meeting, to take up again the humdrum burden of the conflicts, annoyances, and irritations of the home, in which her problem had its origin and center. She may at least be forgiven for wondering whether it is really helpful, except to the speakers and the promoters, for her to be schooled into training for citizenship, or for International Intelligence and attitudes, or for racial bigotry, whatever that may mean, a young tyrant who has normally no civic virtues to begin with, either domestic or international, and who might not be worth bringing up if he had at that period of life. She may even have a similar reaction to at least an occasional Parent Teachers meeting, but would hardly dare to express her doubts. Perhaps after the children have gone to bed she might pick up a paper and find one of those refreshingly simple, direct, and really helpful articles by a schoolteacher by the name of Angelo Patri and feel encouraged. But that is so simple, so understandable, so "home folks" in its approach and wording that it evidently lacks the stamp of modern scientific authority. She must not falter in her effort to keep up with the times. A book on Behaviorism obtrudes itself. Behavior is just the thing she is interested in, and here she finds the apotheosis of the laboratory method of child study in the raw. It is a bit staggering to be told that all of the maternal attitudes and virtues that have been cherished throughout the ages are

*Read before the Philadelphia Psychiatric Society, April 11, 1932.
†From The Children's Memorial Hospital, Chicago, Illinois.
‡Reprinted from The Journal of Pediatrics 2: 1, 1933.

"hooey" and "boloney," even dangerous forces that must be replaced by cold scientific data and procedures if the race is not to go under. It may be even more disconcerting to read that it might be better not to bring children up in the home at all. Even to her untrained mind this may seem like a rather unique aloofness from a biologic principle that runs throughout the whole world of animal life except the very lowest. She may be a bit suspicious that she has run across an "enfant terrible" in the psychologico-psychiatric fold such as are found in all such large aggregations of workers in a new and progressive field of endeavor. She seeks an antidote in further reading on child psychology, guidance and psychiatry, and mental hygiene. Here again things do not seem perfectly clear. She finds it hard to orient concretely her own problem in the midst of what seems rather confused and controversial dogma from apparently equally high sources. She finds a peculiar new emphasis placed on the importance of sex in the matter of behavior expressed with a frankness that may at times seem as though it were hauled in by the heels. She may even wonder how she and all previous generations of men grew up to an apparently safe normal in a world in which sex was soft pedaled, possibly even on sound biologic and esthetic grounds. She finds, too, a new verbiage that is hard to encompass and apply practically, about personality and patterns; complexes and reflexes; sex tension and libido, infantile and suppressed; egocentricity and maladjustment; attitudes, fears and needs; urges and drives; dreams; self-expression and finding oneself, and what not. By this time the child himself should easily be, or at least seem, a problem and the mother even more so. The time has come to go to a psychiatrist. If she finds the right person, or the right clinic she will probably find help, maybe not. It is a big problem to make over two people and change an environment as well. All diseases are not curable, but fortunately we outgrow more of them than we are apt to think we do. If she goes to an ultramodern, high-power clinic she will probably be deeply impressed, maybe not, by the complicated machinery of approach, the strange and ramified method of search that goes back to the grandparents and that makes the ordinary big "once over" now so current in medical practice look like a piker by comparison. She is apt to find herself the target of questions, as is also the child, that even the modern matron, even if she is young, may find embarrassing; questions that she either resents, outwardly or inwardly, but perhaps more commonly accepts as one of the sacrifices that must be laid on the altar of the great scientific investigation and uplift of child life. I have perhaps presented an extreme picture; it is not, however, a rarity. It is intended to serve as an illustration of a tendency that is inescapable, is now very evident on all sides, and threatens to grow apace. Perhaps the depression may help.

I have laid especial emphasis on the mother. The child's reaction is inseparably interwoven with that of his mother. The essential difference between a child and an adult must always be kept in mind, not abstractly but concretely and individually. The biologist, the psychologist, and the psychiatrist know this and do it; can we expect the same of the mother? The child is no more a miniature adult mentally than he is physically. His mind is not only simple—it is undeveloped in the sense of being primitive. The biologic law that the ontogeny is a short recapitulation of the phylogeny has a counterpart, or a continuation, in the fact that in his psychic development the child crudely repeats the history of

the race. His conduct may seem amazing and nerve-racking to his mother but it is normal for his age, must be so considered, and must be met on that plane. He has a verve and an energy and a rebellion against restraint that amounts to belligerency. He is in ceaseless activity and almost tireless. He loves noise and bustle. It is useless to ask a mother whether her young child is normally active if she has only herself to go by. His desires and his emotions are unbridled and he is born with no sense of shame, or of sympathy for others in exercising them. Life has a zest that is unique for this period. We come into the world as Wordsworth has so exquisitely expressed it "trailing clouds of glory," and "Heaven lies about us in our infancy." We can no longer feel the same as a child feels when we have all too soon reached the stage in which "there has passed a glory from the earth," and even the memory of that glory is blurred. We have scant patience with the things we ourselves were and did. Being cooped up in an apartment, or nearly anywhere else with restrictions on normal activity that I have indicated, inevitably leads to conflicts as the mother attempts with varying tempo to adjust the child to the necessary conventions and inhibitions of later life. Such conflicts are normal in any environment but modern life has made them acute as never before. The "don'ts" and the "I wills" clash and the latter win out as the mother is worn down and the child acquires an active immunity to discipline. The problem naturally follows. The following incident is a sort of epitome of the whole situation and bears repeating: (2) "I was trying to examine a child who was crying and fighting constantly. The mother started off bravely with all kinds of sympathetic measures and endearing terms, such as 'lover, darling, precious baby, sweetheart, won't you hold still for the nice doctor?' Then suddenly she cracked under the strain and shouted, 'For God's sake, Frankie, shut up!' "

Under such circumstances it is hard for a mother to appraise her child's behavior—to decide whether he is safely normal, or abnormal enough to require help. The more she looks into the matter the more, I feel sure, will she be stimulated to find something wrong that requires psychiatric care and that early. As illustrations I might cite the following incidents: A mother with inverted nipples called up her pediatrician and said, "My baby is only two days old and already he has a negativism; he won't nurse." Another mother and a friend took a young child to a child guidance clinic. The mother said she wanted him "psychoanalyzed." The friend interposed, "No, it wasn't the psychoanalysis you wanted, it was the inferiority complex, wasn't it?" The mother will naturally look for a yardstick with which to match her child's intelligence, behavior and aptitudes with an established assumed normal, as she did in the nutritional situation his weight and height with the tables of average weights and measures. It is such a simple thing to do to solve so weighty a problem. All she has to do is to find out what he can do and will do, perhaps under somewhat unnatural conditions. This holds him up to a scale of age performance which records his mental age. If this is multiplied by 100 and divided by his real age we have his intelligence stated in figures. There is something intriguingly concrete about figures—it has even become proverbial that "figures do not lie." This procedure, however, requires some one especially trained to carry it out. She can do it herself, especially in the period of infancy, by holding him up to Gesell. How things have changed is shown by the fact that many years ago Preyer wrote an exhaustive treatise on this subject, that

appeared in English translation under the title "The Senses and the Will." In all that time it has been the standard authority in medical circles and has been quoted in our pediatric textbooks. It never got to the laity except by medical application. The intelligence quotient is a valuable and practically useful item if it is properly interpreted as a crude determination of a child's present mental status, just as a child's comparative weight is a crude measure of his present nutritional state. It is not a safe thing to give to the mother, or to the child, even less to the public. The contributions of Gesell are the most fascinating and instructive that have appeared since Preyer's time. They are readily accessible to the laity and therein lies a certain danger. No matter how much stress may be laid on the fact that there are fairly wide normal chronologic variations in development the mother is going to accept the average as the established standard with resulting elation or depression as her child rates ahead of, or behind, that standard. I know a very intelligent mother who worried all during her child's second year and half of the third because he used only a few words even at that late period. She held him up to Gesell and found that if a child was two and one-half years old and did not talk there was probably something seriously wrong with him. If idiots and imbeciles are included that is true. This child was neither. He was normally bright in every other way. In spite of my repeated assurances that every child who looked and acted bright and had no defect in hearing would talk even after two and one-half or three years, she nearly took him to a psychiatrist and a specialist in speech. I have often wondered how they would have gone at the thing. Now that he talks normally there is left only the memory of many unhappy months.

It is one of the common observations in pediatric practice that children do not follow standard chronologic patterns of advance in their mental and behavior development any more than they do in their physical development. In both instances there are spurts and retardations, both in general and in particular phases of developmental advance, that may be either innate or environmental in origin and that have little bearing on the final outcome. I think every pediatrician of ripe experience has observed too that there is a natural tendency for those who are somewhat aberrant in childhood, either physically or mentally and behaviorly, to straighten out as they get older, for one reason or another. It is surprising as one sees children grow into adult life how many that seemed rather hopeless in early life from a behavior standpoint turn out to be all that could be desired later in life. In that there ought to be some comfort at the present time. One of the most faithful and devoted mothers that I have ever known told me once that when she was a young girl her mother used to think that "she would end up on the streets," as she put it. I used to go to school with a boy of about sixteen years who was the village "cut up" and all around bad boy. He was an adorable little cuss in one way and incorrigible in others. He was not considered a safe playmate by the good mothers of other boys. He ran away from school, got into scrapes of many kinds, and finally got drunk one night and slept in the village stockyards. The next day he ran away from home, rode the bumpers all over the West for several years, consorting with tramps, sometimes eating in restaurants and sneaking out when the waitress went back for an order, and never once writing home. In due time he settled down, went to college and medical school, got married and

became an unusually staid and worthy practitioner and citizen, rather puritanical in his outlook on life. Both of these individuals presented rather major problems in behavior. I wonder if a psychiatrist could have done a better job than was done by time itself, together with one of those unpredictable and determining changes in environmental forces that often come when least expected. I think there is a real possibility that they might both have fared less well under psychiatric care. It is not a wholly care-free procedure to take a child to a psychiatrist or a psychiatric clinic. It is not as bad as going to jail or to an insane asylum, but after all it is only a matter of degree in a way. Young offenders are not sent to jail—they go to a reform school. The insane are not sent to an insane asylum—if they can afford it they go to a sanatorium for the nervous. For the same good reason we see the same mollifying tendency in the "Child Guidance Clinic" as compared with the "Psychiatric Clinic." Be that as it may, there is a certain danger inherent in the procedure. In saying that I am not thinking of the psychiatrist or the child guider, any more, or just a little more, than I did of the pediatrician in the analogous situation to which I have already referred. I am thinking of what is going on at home, of what the lay reaction is to the procedure. The pediatrician was *particeps criminis* in producing the child that gloried in the distinction of being able to say, "I don't eat," with all that went with it. We had a little girl at our hospital not so long ago who told any one who came near her and seemed interested, "I'm a problem." She was, and she was doubtless more of a problem because she knew that she was a problem. Others may not express it in words but they sense it, as children will so readily, and they get the same kick out of it that the child does who will not eat and for the same reason. If this whole movement spreads apace as it seems to threaten to do and if every one out of every three children is taken to a psychiatrist or a child guider, as has been suggested, then I am afraid this reaction, expressed or sensed, will occur often enough when mothers add to their baby doctor, and their family doctor, and their throat doctor, and their beauty doctor, a behavior doctor.

In any activity such as that in which we are now concerned there are always many and varied forces at work. There are many restrained, sober, safe men and women who are doing well the needed work in investigation, in clinics, and in private practice. There are sane, understandable, and safe books that are helpful to the laity, such as those of Thom, Anderson, Cameron, Angelo Patri, and doubtless others with which I am not so familiar. To those one can only wish Godspeed. On the other hand there are always a few unbridled enthusiasts, extremists, wild theorists, dreamers, dialecticians, synthesizers, sensationalists, whose feet are not always on the ground, and perhaps even occasionally one whose motives may not bear close scrutiny. Unfortunately these have an appeal especially to those who do not understand them, and are often most vocal in their efforts. There is also a current tendency in medicine to volume delivery. There is apparently also a tendency, that I am told is not unknown in trade in Mexico, of charging more wholesale than retail. To a somewhat old-fashioned clinician who feels that he can make a safe diagnosis in 90 per cent to 95 per cent of cases without laboratory assistance the modern so-called "big once-over" in medicine is a bit disquieting. The ramifications and all inclusiveness of the procedures of some of our psychiatric and child guidance clinics leave much the same impression. Even

farther, in one of our large cities I am told there is a Society of Psychoanalysts, membership in which requires the candidate to be psychoanalyzed himself. Apparently a psychoanalyst is not a full, safe, real psychoanalyst until he has himself been psychoanalyzed. I am told that this process, fully accessible to the laity, of course, requires a year or more of almost daily one hour analyses at the current rate of $25 an hour. I am told that $3,000 or $4,000 is a moderate retainer, a rather intriguing word; that that amount is often doubled, and that business is good. There is a comfort in a situation like this if one can look at it from an historical point of view.

Another force that must be reckoned with most seriously is that of the layman himself, more often, herself, as a propagandist in the interpretation, diffusion, and practical application of all this new and confused knowledge of psychology and psychiatry. It has wide ramifications and in sheer volume exceeds all others. It is made up of many individuals and groups of individuals that vary in kind and method and motive and influence from individual to individual, and from group to group. They are commonly actuated by a sense of a duty, sometimes by a laudable desire for power and influence, sometimes by ambition in the professional or social scramble for preference. Unfortunately they necessarily have that "little knowledge" that Pope has immortalized as "a dangerous thing," and from the very nature of things they cannot "drink largely of the Pierian spring" that "sobers us again" when "shallow draughts intoxicate the brain." It includes the psychologist who becomes a clinician, the psychiatrist who has no medical background, the psychiatric worker who enters the field without medical supervision and restraint. It includes the young college graduate who has specialized along these lines, who knows little or nothing about the delicate mechanism of the family from personal contact, and who is still in that unmellowed transition period in which knowledge is assumed to be synonymous and coextensive with wisdom and experience in practical application. Youth is dynamic, full of assurance and enthusiasm. Life and its problems are clear cut and easy to meet and to solve. It includes the school nurse in a strategic position second to none. It permeates the activities of the woman's clubs, the child study clubs, the parent-teachers' societies, the societies for child study and parent education, the schools from the kindergarten and before, up through college, the professional recreationist, the lay writer and lecturer, the columnists, the radio broadcast, the health department bulletin, the afternoon tea and the bridge party. Some of this is probably helpful through calling attention to a situation that exists, some of it is safe and harmless, some of it is merely running around in a circle with a social background, not a little is pure dilettantism, and some of it plainly pernicious. As an illustration of the latter I might cite a private school, a high-grade modernistic psychologized school, in which the pupils in one room were divided into those of normal, superior, and inferior intelligence, and their names were posted on the wall on that basis. A very bright but shy little fellow who had not yet become socialized, and I suppose had not yet "found" or "expressed" himself, whichever it might be, was found posted in the inferior class. Some of it is amusing. A young woman, I do not know her exact classification in the uplift, walked into a schoolroom, appraised the situation with an authoritative glance, and announced quite audibly, "I don't believe there is a normal child in the whole room."

A cultured, unmarried woman of mature years once summed up her reaction to this phase of the whole subject by saying with a twinkle in her eye, "As a spinster I have one ambition in life: to write two books—one on the rearing of children and the other on the management of husbands."

I am fully aware that the sane, common-sense psychiatrist does not welcome, much less encourage, this intrusion into a field that is in the making and that requires sober investigation and wary procedure if it is to be safe and helpful. But it is there, it always is there in such movements. It grows until it becomes top-heavy and finally declines from its own inertia. That it is still growing in cultured soil is evident from the fact that the evening on which I gave my paper in Boston there appeared a short, to me at the time rather disquieting, article in one of the newspapers, headed, "Massachusetts Leads All States in Psychiatry." It went on to say that the whole state was to be organized psychiatrically. Psychiatry was to be introduced into the elementary and high schools, was to be taught more extensively in colleges and to nurses, especially school nurses, was to be made accessible to all laymen, and finally was to be made practically available to teachers and clergymen in their work. If, as John Dewey used to tell us when I was a student, "the purpose of an institution is to do away with itself," then one may clearly pray for the success of psychiatry in Massachusetts.

A most encouraging promise of eventual improvement in the whole situation is the report on Psychology and Psychiatry in Pediatrics: The Problem, by a sub-committee of a Committee of the White House Conference. That this sub-committee, composed of a pediatrician as chairman, and seven psychologists, psychiatrists and child guiders was able to present a unified report is a matter of some significance. I think if all of us would read that report with an open mind it would help materially to clarify the present confusion. As a masterpiece of analysis and synthesis, of comprehensive yet incisive presentation of a complex subject, the report of the chairman, Bronson Crothers, will bear reading many times with profit both to the reader and to the situation under consideration. There is a temptation to quote from it freely and often. The following quotations seem peculiarly appropriate in the present connection—"The technique of propaganda and instruction is decidedly faulty and should be studied with prayerful eagerness." . . . "We trust that restraint, a peculiarly difficult attitude for the pioneer, will become a routine virtue as the science of psychiatry grows to maturity."

One thing more in conclusion. In this psychologic and psychiatric and mental hygiene movement we are all engaged in trying to meet and remedy a situation that already exists. There is something new and morbid about the situation itself. It smells of the machine and of exhaust instead of the woods and of new-mown hay. The song of birds has given way to the honk of the auto and the screech of the street car. Our children are being analyzed and classified and moulded and packed into a pattern that lacks the spontaneity and freedom that is the birthright of the child in "the playtime of life." It is idle to hope for any adequate prophylaxis, the only full solution of the problem. The simple life has gone the way of the Dodo, never to return. Perhaps it is best so for us. Who knows? But for the child we must ever strive for that ideal of simplicity so far as it is environmentally possible. Anything that will help us to visualize cou-

cretely what a normal child is like in a normal free environment unrestrained by the conventions of a complicated world should help us to approach that ideal. It is for that reason that the experiment conducted by Dr. Clara Davis,[4] to which I have referred many times,[1, 2, 3] is to me an outstanding contribution to child life. It began as a simple experiment in nutrition, to see what a normal hitherto wholly breast-fed infant of eight months would eat and do if allowed, unaided and unhampered, to select its own food from a large assortment of raw and cooked, but unseasoned, uncombined and unsophisticated foods made up of such foodstuffs as we ordinarily associate with the older child or the adult. It has gone much farther. The experiment extended to 14 such babies and over a period of six or seven years. No psychologist has ever entered the place except as a visitor. No child guider or psychiatrist has ever been needed. No pediatrician has obfuscated the normality of things by introducing a meticulous régime. There was a normal exercise of gregariousness, not without the occasional physical encounter that arises from momentary conflicts of viewpoint or interest that characterizes the normal child and proves that he is normal. There was no indigestion—no anorexia except with sickness. A rickety baby got well by himself. There was little restraint—hence no serious rebellion, no problem. They were the finest group of children of that age that I have ever seen, physically and behaviorly. They were not bad, they were not too good, they were normal. All this was done in an old made-over house, in an ordinary street in a built-up section of a large city. I wish every psychologist, every psychiatrist, child guider and mental hygienist, and, even more, every pediatrician could have seen the whole thing and with an open and a plastic mind. It loses in the telling—it had to be seen to get the full effect. I think it would have influenced their whole attitude toward the child as it has mine. It seems to me of great interest in the present connection.

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Department of Orthodontic Abstracts and Reviews

Edited by

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Life Cycle of the Pulp. Review of "Pathologie und Therapie der entzuendlichen Erkrankungen des Zahnmarks" by Dr. R. Weber, Stuttgart, 1933, Ferdinand Enke.

The dental pulp undergoes, from its first formation until its ultimate death, a great number of changes, which in their entirety constitute its life cycle. The orthodontist who is very much concerned with the biologic reactions of the pulp will follow with interest some of its manifestations which are described by Dr. Weber.

CHANGES AT THE APICAL FORAMEN

That *more active life phenomena occur in the pulp* than in any other tissue of the human tooth, is due to its generous blood supply. There is usually not one but a number of arteries entering at the apical foramen, especially in the newly formed tooth where the foramen is wide; sometimes as many as sixteen blood vessels have been counted. In later life, the foramen is gradually narrowed down by deposition of secondary dentin on its pulpal side, and of cementum on its peridental side; this leads to a more or less pronounced constriction of the vessels, and to a diminished blood supply to the pulp. The future fate of the pulp is, to a great extent, determined by these changes at the apical foramen, which control its vitality and its resistance.

CURVATURE OF ROOT END

Before the tooth is completely formed, changes at the foramen may result from curvatures occurring in the apical third of the root. Even under normal conditions, a slight distal curvature is frequently found; this is explained by a difference in the rate of growth between alveolar process and jaw bone proper; the alveolar process grows mesially at a faster rate, leaving the root part somewhat behind. This causes a pull on the blood vessel nerve-bundle entering the tooth at its foramen. As the root end is not fully formed and calcified, the tightly stretched blood vessel nerve-bundle produces a deflection of its soft tissue parts. Curvatures of the root ends are also found as the result of shifting of teeth from the loss of approximate contact. These curvatures are not so pronounced, because the roots are at the time already completely formed. The stretching of the blood vessel nerve-bundle, however, produces resorption of dentin and cementum on the side of pressure, and ap-

position on the side of pull. In this manner, the apical foramen moves in a direction opposite to the tooth movement. (Similar curvatures in the apical third of the root have been described after orthodontic treatment when extensive movement was carried on at the time of root formation. In the light of Dr. Weber's findings, these artificially produced curvatures may be viewed with less apprehension.—E. N.)

NUTRITION OF DENTIN AND ENAMEL

Besides nourishing the pulp tissue itself, the pulp vessels also furnish the needed lymph supply to dentin and enamel. This fact has long been open to discussion but appears to be accepted most generally at the present time; hardening of the enamel in pulpless teeth and slower progress of caries in such teeth are clinical indications of it.

STIMULATION AND IRRITATION OF THE PULP

While the pulp in this way is responsible for the vitality of dentin and enamel, these two tissues, on the other hand, have as their function the protection of the pulp. It should be well understood that the living pulp is highly sensitive to outside influences; an open pulp exposure is, naturally, connected in everybody's mind with a severe damage to the pulp; but only rarely are we aware of the fact that *every disturbance of enamel or dentin has, by necessity, a more or less severe reaction in the pulp as its consequence.* Even a high grade attrition which reduces the thickness of these tissues has its definite response, namely, the gradual formation of secondary dentin as an added protection; a warning, therefore, must be sounded against unscrupulous artificial grinding away of enamel and dentin; secondary dentin formation cannot take place with equal rapidity, and in the meantime the pulp is exposed to thermal and to chemical shocks.

An even more pronounced irritation of the pulp is caused by dental caries. (The author uses here a very illustrative term for caries, calling it "gangrene of the hard tissues.") Even small carious lesions allow the absorption of toxins into the pulp. At first, the pulp reacts with the formation of secondary dentin as nature's endeavor to wall off the infected area; later on, the secondary dentin is also attacked and necrosis of the odontoblasts and the other cells of the pulp follows together with the signs of acute or chronic infection. It should be understood that the pulp can be very seriously affected without the decay actually penetrating into it; even extensive preparations, or large fillings and inlays may produce various forms of degeneration and necrosis, which fact explains clinical symptoms that are sometimes difficult to interpret. On the other hand, infection of the pulp, followed by degeneration and necrosis, can also be the result of systemic conditions as is evidenced by the development of hematogenic pulpitis in septicemia.

REGRESSIVE CHANGES

With advancing age, regressive changes take place in the pulp. The narrowing of the apical foramen has already been mentioned; gradually, the odontoblasts degenerate, and the typical pulp cells diminish and disappear,

being replaced by connective tissue; other organs atrophy by shrinking in size, but the pulp cannot shrink, being enclosed in a cavity of fixed dimensions; therefore, cysts of various sizes develop in the pulp stroma, filled with lymph; calcium salts are deposited around dead tissue cells, forming smaller or larger pulp stones. These regressive changes occur at a comparatively early age, because of the unfavorable nutritional conditions caused by the narrowing of the apical foramen.

After these biologic considerations, Dr. Weber proceeds to describe in a most instructive manner the pathology and the therapy of pulp diseases, which, however, shall not be considered here in detail. His descriptions of the various reactions of the dental pulp are of great practical value to the orthodontist; especially enlightening are his statements about the curvatures of the root ends. It would be most interesting to have his findings about the shifting of the apical foramen verified in teeth which have undergone orthodontic treatment. There is one point in the book where we cannot agree with the author; this is his reference to the pulpless tooth as a "dead" tooth. *Pulp, dentin, and enamel of such a tooth may be dead, but the cementum remains functioning;* its life process is manifested by cementoblasts depositing new cementum around the root. This distinction has a bearing on orthodontia. Tooth movement takes place by the absorption of alveolar bone on the side of pressure, and by the formation of new bone on the side of pull. The peridental fibers which were attached to the resorbed bone are destroyed together with it, and new fibers are formed. The new fibers become, on their upper ends, attached to the new bone, while on their lower ends they become attached to the cementum, and this process necessitates the continuous formation of new cementum. For this reason, the life of the cementum is of greater importance to the orthodontist than that of any other tissue of the tooth, and, for all our practical purposes, the tooth which has a sound cementum is a live tooth.

The International Journal of Orthodontia and Dentistry for Children

PUBLISHED THE FIFTEENTH OF EVERY MONTH BY

THE C. V. MOSBY CO., 3523-25 Pine Blvd., St. Louis, Mo.

Foreign Depots—*Great Britain*—Henry Kimpton, 263 High Holborn, London, W. C.; *Australasia*—Stirling & Co., 317 Collins Street, Modern Chambers, Melbourne; *India*—"Practical Medicine," Egerton Street, Delhi; *Porto Rico*—Pedro C. Timothee, Rafael Cordero 68, San Juan, P. R.

Subscription Rates—Single Copies, 75 cents. To any place in United States, Cuba, Porto Rico, Canal Zone, Mexico, Hawaii and Philippine Islands, $7.00 per year in advance. Under foreign postage, $7.40. Volume begins with January and ends with December of each year.

Remittances—Remittances for subscriptions should be made by check, draft, post office or express money order, payable to the publishers, The C. V. Mosby Company.

Contributions—The editor will be pleased to consider the publication of original communications of merit on orthodontic and allied subjects, which must be contributed solely to this Journal.

Opinions—Neither the editor nor the publisher holds himself responsible for the opinions of contributors, nor are they responsible for other than editorial statements.

Reprints—The publishers will communicate with authors regarding reprints upon publication of paper.

Communications—Contributed articles, illustrations, letters, books for review, and all other matter pertaining to the editorial department should be addressed to the Editor, Dr. H. C. Pollock, 4482 Washington Blvd., St. Louis, Mo. All communications in regard to advertising, subscriptions, change of address, etc., should be addressed to the publishers, The C. V. Mosby Company, 3523-25 Pine Blvd., St. Louis, Mo.

Illustrations—Such half-tones and zinc etchings as in the judgment of the editor are necessary to illustrate articles will be furnished when photographs or drawings are supplied by the authors of said articles.

Advertisements — Objectionable advertisements will not be accepted for publication in this Journal. Forms close first of month preceding date of issue. Advertising rates and sizes on application.

Change of Address—The publishers should be advised of change of subscriber's address about fifteen days before date of issue with both new and old addresses given.

Nonreceipt of Copies—Complaints for nonreceipt of copies or requests for extra numbers must be received on or before the fifteenth of the month of publication; otherwise the supply may be exhausted.

Entered at the Post Office at St. Louis, Mo., as Second-Class Matter

EDITORIAL

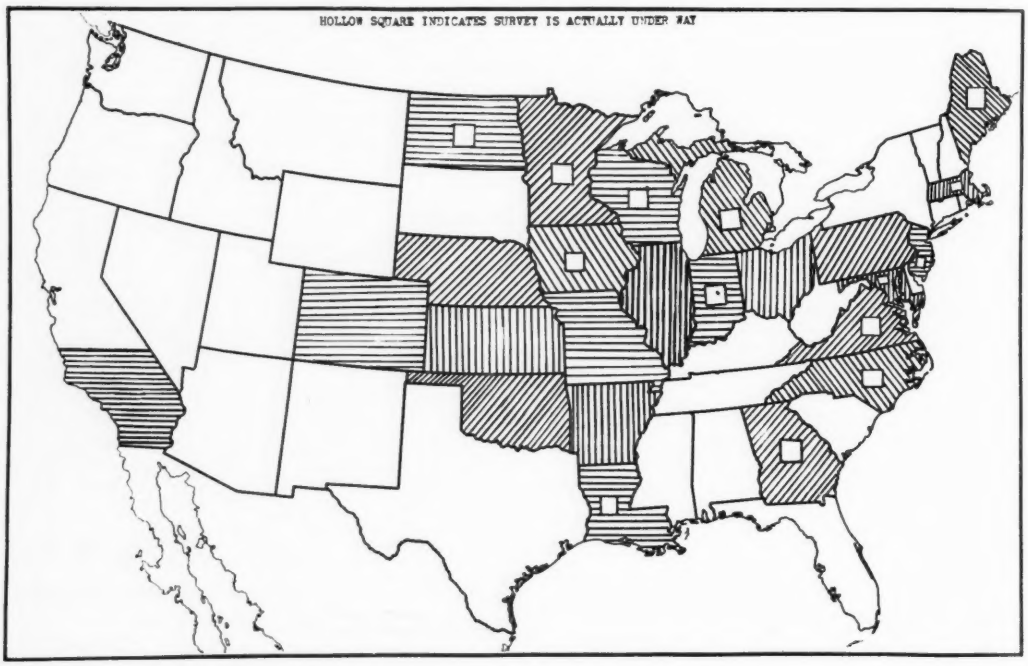
United States Public Health Service Survey

THE United States Public Health Service has now completed surveys of the state departments of health, education and welfare in eighteen states in conjunction with the nation-wide dental health survey. In addition to this, ten states are being surveyed by mail at this time, and to date twenty-four states have agreed to participate and cooperate in the survey.

Examination blanks for this purpose are being forwarded to fourteen of the states; organizations are being perfected in the remaining ten states, and

examinations will be under way in a very short time. There are five additional states in which the program is now under consideration by the officers of the state dental societies.

Additional information developed to date 1,467,758 examination blanks have been distributed in those states which are cooperating with the Public Health Service. These states will return the completed blanks to the Health Service for tabulation. The organization for the tabulation of the completed examination has been perfected and authority secured to employ ten additional people for this purpose. One of these employees is an experienced statistician, and the rest are experienced operators of tabulating machines. The tabulating work was scheduled to start January 1, 1934.



States cooperating in survey of dental needs.

The accompanying map indicates the progress of the survey up to this time. The survey is now actually under way in the states which have a hollow square in their center.

It is significant, but may not be sufficiently well understood, that the survey which is in progress is one of the most comprehensive and important moves ever launched within or without the dental profession. The survey will supply information which will be available for the government, the dental profession and the laymen. It will be interesting and enlightening, and no doubt will be very important in designating the future trends of dentistry. History has shown over a period of centuries, both B.C. and A.D., that usually great fundamental movements occur before the very eyes of the populace, and the latter look on in wonderment hardly realizing there is a passing parade in progress.

The federal government of the United States, along with the "new deal," is rapidly crystallizing the thought that medical and dental care for the unemployed is as important as are food, shelter and clothing. It is focusing its atten-

tion to the assumption that the health and physical well-being of its populace, and particularly of its children, are as important to the commonwealth as is the education of its people. Industry, even all local government in the United States is looking to Washington for direction. Local governments are deeply dependent upon loans and subsidies from Washington. The cotton farmer is plowing under his cotton and being paid per acre for doing so, as is in like manner the wheat farmer. The hog corn farmer is about to be the recipient of a $3,000,000,000 dole to compensate him for his loss in arranging his program of activities in order that it may conform to government specifications. It is now being rumored that the packing industry should be taken over and practically be dominated by the government in order that the farmer should not have the price he receives for his hogs and cattle fixed by the packer alone, as it is claimed that the packing industry is a syndicate fraternal in thought and action.

Now comes along as a "tail wind" in this great maelstrom of activities, considerable agitation for socialized dental service and for aid in providing help for the indigent. It is proposed by the Federal Emergency Relief Administration that the dental care for the social class under consideration is to be accomplished as the result of an agreement between the Relief Administration and organized dentistry. Such agreement it is further proposed is to be reached finally by ascertaining the least amount of treatment which may be given to the patient consistent with safety, and then it is proposed that a charge be fixed which a practitioner who did not have his entire time occupied might be willing to accept as compensation for his services. It is realized by most practitioners that the time has come when something must be done for unemployment relief by dentists; however, they view with apprehension this sweeping agitation for socialized dental service, inasmuch as the possibilities of professional service becoming politic and involved are great.

Not unlike the farmers, the dentist is also in this situation. In conducting a private practice, maintaining an overhead consisting of rents, laboratory services and supplies, the point to where he may reduce his fees and still be on the right side of the ledger is not remote from where most dentists have their fees at this time. The spokesmen and committees for the dental profession should be cautious; values should be preserved lest the profession suffer economic oblivion. The farmer has suffered for years and is now compelled to receive the dole, along with the laborer who gets the CWA funds.

H. C. P.

IN MEMORIAM

DR. HELEN R. STAHLE

DR. HELEN R. STAHLE, an orthodontist of Hollywood, Calif., passed away at the Hollywood Hospital Tuesday, December 12, 1933, following a major operation.

Dr. Stahle was associated with Dr. Tanzey of Kansas City in the practice of orthodontia for a period of five years. Soon after the death of her husband, Claude E. Biles, about seven years ago, Dr. Stahle located in Hollywood, where she limited her practice to orthodontia, retaining her maiden name, professionally. In 1910 she was graduated from the University of Iowa, and in 1920 took a postgraduate course at the International School of Orthodontia in Kansas City, later becoming a member of the faculty of that

school and a demonstrator in the orthodontia department of the Kansas City Western Dental College.

Dr. Stahle was well known throughout the middle western states, where she spent the major portion of her professional career. She had passed the rigid examinations of state dental boards in California, Illinois, Iowa, and Missouri, which, together with a varied experience, automatically by reciprocity rendered her eligible to practice in many other states, a rare qualification, possessed by few dentists.

At the time of her death she held membership in the American Dental Association and the American Society of Orthodontists, and bore the distinction of being the only woman orthodontist to be admitted to membership in the Pacific Coast Society of Orthodontists. She was a member of the Alpha Upsilon Pi Dental Sorority.

NEWS AND NOTES

Southern Society of Orthodontists

The thirteenth annual meeting of the Southern Society of Orthodontists will be held at The Homestead, Hot Springs, Virginia, July 16, 17 and 18.

A cordial invitation is extended to all ethical members of the dental and medical professions.

N. F. MUIR, President,
Shenandoah Life Bldg.,
Roanoke, Va.
WILLIAM P. WOOD, JR., Secretary,
442 W. Lafayette Street,
Tampa, Fla.

Great Lakes Association of Orthodontists

The annual meeting of the Great Lakes Association of Orthodontists will be held at the Royal York Hotel, Toronto, Ontario, May 7 and 8.

A cordial invitation is extended to all ethical members of the dental and medical professions.

STANLEY A. MACKENZIE, President,
1011 Stroh Building,
Detroit, Michigan.
RALPH P. HOWARTH, Sec'y-Treas.,
1140 Hanna Building,
Cleveland, Ohio.

Kansas, Missouri and Oklahoma Tri-State Meeting

The state dental associations of Kansas, Missouri and Oklahoma will hold their annual meetings jointly at the Ararat Temple, Kansas City, Mo., May 6, 7, 8 and 9. An excellent program has been arranged, and all members of the American Dental Association are cordially invited to attend.

FRED A. RICHMOND,
305 Federal Reserve Bldg.,
Kansas City, Mo.

Association of American Women Dentists

The thirteenth annual meeting of the Association of American Women Dentists will be held at the St. Paul Hotel, St. Paul, Minn., on August 6, 1934.

A cordial invitation is extended to all women dentists.

GENEVA E. GROTH,
1301 Medical Arts Bldg.,
Philadelphia, Pa.

European Orthodontological Society

The annual meeting of the European Orthodontological Society will be held at the Hague, under the presidency of Dr. Ch. F. L. Nord, on Tuesday and Wednesday, May 21 and 22.

The program will be devoted to papers and discussion on "Prophylaxis During Orthodontic Treatment," and "The Open-Bite."

It is essential that any member wishing to contribute to the program shall present the paper in person.

This meeting follows immediately the meeting of the American Dental Society of Europe.

G. F. CALE-MATTHEWS, Secy.
60 Newhall Street
Birmingham, England.

Notes of Interest

Dr. William A. Murray of 636 Church Street, Evanston, Ill., announces the opening of a branch office at 2 North Sheridan Road, Highland Park, Ill. Orthodontia exclusively.

Dr. Norris C. Leonard announces the removal of his office to 107 East Chase Street, Baltimore, Md. He practices in Hagerstown, Md., on Mondays, office in the Wareham Building. Orthodontia exclusively.

The Hershey Industrial School has added an Orthodontic Department to the Dental Clinic. Dr. Herbert K. Cooper has been appointed orthodontist in charge. Dr. Joseph Krimmel is in charge of operative dentistry.